Library

SECOND SERIES VOL. IV, No. 10

BULLETIN

OF

THE NEW YORK ACADEMY OF MEDICINE

OCTOBER, 1928

INSTITUTED 1847

PUBLISHED MONTHLY BY
THE NEW YORK ACADEMY OF MEDICINE
Fifth Avenue and 103rd Street
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EDITORIAL

MEDICAL PROVERBS, APHORISMS AND EPIGRAMS

Proverbs, as terse, net summations of folk-wisdom, are supposed to emanate from the heart of the people; but like the first rock paintings of prehistoric man or the rude beginnings of folk-music, they were inevitably the product of a few individuals of superior intelligence within the tribal group. Conceived mathematically as a mode of energy, like heat, light or electromotive force, mind obviously cannot function *via* dispersed groups but only through an individual unit. *A fortiori,* the genuine products of mind never emanate from crowds, activated by "herd instincts" of the most rudimentary order. The celebrated dictum of Gabriel Tarde, that "the collective intelligence of a crowd is less than that of any one of its individual members" is a hard proposition for the sentimental to digest, but it explains many of the mishaps which have befallen humanity and to which it is still liable. Were crowds activated by collective "intelligence," the political changes wrought by the French and Russian Revolutions would have been effected without violence and with a minimum expenditure of energy; there would have been no World War, and "organization" for business or military enterprises would be superfluous. Crowds may be trained but they cannot think. A mob in an emotional state is, in the accurate view of the Italian Campanella, "a beast with muddy brain," and this condition is likely to remain constant as long as man remains man. It is for this reason, as Renan says, that humanity has been so frequently "betrayed by its leaders." When the Scotch clansmen spoiled a movement they did not fancy by melting away from it, the "crowd" happened

to be made up of hard-headed, close-reasoning units, each operating on his own initiative and responsibility.

The first thing noticeable about folk proverbs is their strong family likeness in space and time. Dealing, as they do, with the fundamental needs and instincts of humanity, they necessarily run to pattern, are concerned with a limited number of basic principles of action and conduct, which crop up monotonously in the remotest regions, under the strangest guises. The next most remarkable thing about them is their extraordinary pungency and cynicism, the harsh wisdom of the countryside, whether around an African kraal, a roadside farm in Jugo-Slavia or on a Siberian steppe. The jabs and jibes at women, for instance, are as cruel and direct as those of the old dramatists or the cynics of the 18th century. Folk proverbs are the bitter fruits of tribal experience, crystallized into word-of-mouth literature by some spirit keener than the rest, the most salient example conceivable of Cowper's (and Herbert Spencer's) distinction between wisdom and knowledge. And here, thrown at the start upon his own bare resources, the primitif is at one with the great physician-philosopher who originated the humoral pathology:[1]

"We mortals are no kings
For each of whom to sway
A new-made world upsprings,
Meant merely for his play;
No, we are strangers here! the world is from of old.

Born into life!—in vain,
Opinions, those or these,
Unalter'd to retain
The obstinate mind decrees;
Experience, like a sea, soaks all-effacing in.

This is not what man hates,
Yet he can curse but this,
Harsh Gods and hostile Fates
Are dreams! this only *is*—
Is everywhere; sustains the wise, the foolish elf."

[1] Matthew Arnold: *Empedocles on Etna.* The line of thought in this drama is derived from the poetic fragments of Empedocles and Parmenides. What Swinburne calls "the long and lofty chant of Empedocles" is a kind of breviary or *credo* of the individualized Greek physician of the period.

City-bound people, standardized as to ways and means by the social and economic forces which bring them into the world, feed, clothe, shelter, tend and bury them, have no such rugged wisdom as this, usually emanating from infertile, sparsely settled areas and suggesting the startling relation which Lowell noted between the observations on life in the classics and their daily confirmation in the files of the morning newspaper. Let us begin for example, with the folk-proverbs of West Africa:

Filthy water cannot be washed.
Silence is might.
Law-makers—law breakers.
Loss of teeth and marriage spoil a woman's beauty.
Pus (scandal) will not flow from a boil you do not have.
Poison should be tried out on a frog.
The looks of a dog betray his pedigree.
A dog that refuses to eat garbage will go hungry.
The crane said to his children: out with you!
A coward will never accomplish great things.
Why worry? To be divorced does not mean to die.
The head of a guinea fowl carries no burden.
A letter has only half the value of a personal call.
Peace is made by the edge of the sword.
The back of a chicken does not mind mosquitoes.[2]
Water never loses its way.
A talkative bird will not build a nest.
To call a dog do not carry a stick.
Big elephants often have small tusks.
A bloodsucker will always manage to live.
An easy life is the death of valor.
If you pass the same tree twice, you may be sure you are lost.
The child of a leopard will be a leopard.
No slave can free another.
A cripple will rarely bring shame upon himself.
A butcher who does not bathe is not patronized.
No monkey makes fun of another.
The hut of a bachelor is never free from evil odors.
No sane man will parade with a stolen goat.
Put the meat away and you'll get rid of the flies.

[2] In some parts of Continental Europe, reduction of malaria has been attempted by surrounding habitations with live stock, to draw the Anopheles away from human skins.

As close observation of life goes, a great general, statesman, scientist or captain of industry could not have done better. We have emerged from the realm of supernatural causes, the Mumbo Jumbo bogies of the tribesmen, into the world of reality. Things are brought down to brass tacks. Some important biological findings of recent vintage are clearly stated and we begin to sense the force of Renan's dictum: *La science est roturière.* The horizon is of brass and iron, with never a lift into the blue for the human spirit. Such keen perceptions of actuality could only originate, as we have said, through some superior intelligence within the tribe. Contrast these, now, with the folk-wisdom of a more advanced and specialized civilization, that of Japan.

A cheap purchase is money lost.
A fog cannot be dispelled with a fan.
He who makes the first bad move always loses the game.
A knowledge of the sacred books is the beginning of sorrow.
What is quickly learned is soon forgotten.
Even the lords of hell bow the knee to the fat purse.
Every man carries a parasite somewhere.
Only the poor give alms to the poor.
Even the dog of a great man wears a proud look.
Lend money to a city, never to a man.
Not all married women are wives.
If a man is poor and humble, even his own wife and children will despise him.
A man's character depends upon whether he has good or bad friends.
Deceive, but don't insult the rich and powerful.
It is easier to rule a kingdom than to regulate a family.
A beaten soldier fears a reed.
A man learns little from victory but much from defeat.
Under a strong general there are no feeble soldiers.

Here we have already advanced several stages in sophistication; we are no longer concerned with the bare essentials of existence but are dealing with a highly organized and very old civilization. In the case of France, a civilization not so old but which has aged more rapidly, it is significant that nearly all the current proverbs of consequence are actually the work of famous men of letters. The rest are merely replicas of the common stock of folk-wisdom of other nations:

The absent are always in the wrong.
A good lawyer is a bad neighbor.
Lazy people are always anxious to be doing something.
The unfortunate are easily wounded.
It is a very vicious animal; if attacked, it will defend itself.
When a man begins to reason, he ceases to feel.
The head of a fool never whitens.
The destiny of nations depends upon what they eat.
It is to our faults that we owe our virtues.
One bad general is better than two good ones.
A life run by rules is but a prolonged mode of disease.
He who complains most is not the most hurt.
Wounded conceit never forgives.
The daughters of the poor are their revenge upon the rich.
Weakness is more opposed to virtue than vice itself is.
To tell stories is the sign of a commonplace mind.
Fear creates gods; boldness makes kings.
There is something in the misfortunes of our best friends which is not displeasing to us.

By contrast, the Irish proverbs have the charm which comes of an easier going, gentler, more tolerant, humorous, whimsical, and, by the same token, more poetic outlook on life:

Hills look green that are far away.
To address a head without knowledge is like the barking of a dog in a green valley.
The stars make no noise.
God is not as severe as He is said to be.
A sweet tongue is seldom without a sting to its root.
The daughter of an active old woman makes a bad housekeeper.
The seekin' for one thing will find another.
A long disease doesn't tell a lie; it kills at last.
He is scant of news that speaks ill of his mother.
A meeting in the sunlight is lucky and a burying in the rain.
A chance shot will kill the divil.
In youth we have our troubles before us; in age, we leave our pleasures behind.
A spender gets the property of the hoarder.
A big belly was never generous.
A wild goose never laid a tame egg.
Better be idle than workin' for nothing.
It's better to be lucky than wise.
The fox never found a better messenger than himself.
Women are stronger than men; they never die of wisdom.

The same tendency is noticeable in the proverbs of Spain, *e.g.*, the case of the famous donkey "who died of other people's troubles." The folk-saws of England, Scotland and Germany get down to bed rock again. What a wealth of physiological observation is implied, for instance, in the English proverb, "Coarse mothers have comely children," or the German, *"Schöne Leute sterben leicht"* (Beauty is easy to kill) or *"Unkraut vergeht nicht"* (Weeds never die). Physical sturdiness may be perpetuated in families, but, apart from other factors, it actually takes a definite amount of substance and many foot-pounds of potential energy to create physical good looks; and we should marvel at the generation of the beauties of old time could we but see the strange saurians and pterodactyls who begat them. The decline of individualized beauty was noted several decades ago and the advent of the period of universal prettiness can be verified on the streets of any city to-day. "Many's the thing can be made for the penny" said the auld Scots wife when she saw the poor black boy. The medical interest of folk-proverbs is, thus, not so much in pathological, as in physiological and psychological observations, the things an observant physician notes by the way in his practice. As is plain from the various collections of medical folk-lore, the actual wisdom of the people with reference to the healing art is apt to be poor stuff. The people are, in fact, the main supporters of quackery, and modern quackery, as Sudhoff affirms, is but a theft from the most ancient phases of folk-medicine.

Dr. Wang Chi Min, of Hangkow, has latterly published an interesting series of 300 Chinese medical sayings and proverbs,[3] some emanating from popular wisdom, others allocated to authors or medical texts. In these, which may be taken as fairly representative of the medical wisdom of China over many centuries, the popular adages are, curiously enough, of practical (clinical) import; the literary are concerned mainly with prognosis and medical philosophy.

[3] Wang Chi Min: Rep. North Manchurian Plague Prev. Service, Tientsin, 1926, V, 300-315.

Popular Sayings

The unlucky doctor treats the beginning of an illness; the fortunate doctor the end.

The appearance of a disease is swift as an arrow; its disappearance slow, like a thread.

When a disease relapses, there is no cure.

Nine out of every ten men have piles.

Out of ten persons, eleven have the itch.

Rather marry a leprous wife than eat chicken reared by a leper.

A wife's leprosy does not pass over to her husband.

If a child is constantly sick, it is due to overfeeding.

In a dangerous illness, call in three doctors.

It is easy to get a thousand prescriptions, but hard to get one single remedy.

Feed a dysentery; starve a typhoid.

In typhoid, treat the beginning; in consumption, don't treat the end.

For colic, get the bowels open.

Rather treat ten men than one woman.

No good doctor should enter the house of a crooked official.

To take one leg of a fly is equivalent to a strong purge.

Diarrhœa is a river-fish complaint.

Before thirty, men seek disease; after thirty, diseases seek men.

Literary Aphorisms

A good doctor is equal to a good premier. Lu Chi.

The doctor controls life and death. Shi Chi.

Men worry over the great number of diseases; doctors worry over the small number of remedies. Pien Chiao.

To become a good doctor requires breaking the arm three times. Tso Chuan.

Wide reading increases knowledge of disease; some clinics give experience in diagnosis; repeated tests make properties of drugs better known. Ch'u Shih.

When a disease reaches the heart, no medicine can cure. Tso Chuan.

A disease often gets worse after having been a little better. Han Shi.

The sage does not treat those who are ill, but those who are well. Su Wen.

The able doctor acts before sickness comes. Liu Kung Cho.

When you treat a disease, first treat the mind. Chen Jen.

You can remove the trouble, if you know the cause. Mo Tzu.

A dirty cook gives diarrhœa quicker than rhubarb. Tung-Su Pai.

To avoid sickness, eat less; to prolong life, worry less. Chu Hui Weng.

Intermarriage of blood relatives affects the offspring. Shih Pai.

Here, in spite of rather hazy semeiology and prognosis, we have, at length, something approaching the tendency

of the Hippocratic aphorisms; but to compare the two is to realize that Greek medicine is the true starting point of modern medical science. For convenience of readers, the following arrangement of outstanding sentences from the total Hippocratic Canon has been allocated, in each case, to the bilingual of Littré, the references to the French translation being across the page:

Sentences From the Hippocratic Canon

The physician who is also a philosopher is godlike (Littré, ix, 232-233).

The highest duty of medicine is to get the patient well; of several effective remedies, choose the least sensational (iv, 312-13).

Wherever the art of medicine is loved, there also is love for humanity (ix, 258-9).

Physicians are many in title but few in reality (iv, 638-9).

The physician whose mistakes are negligible wins my unqualified praise (i, 590-91).

Life is short, art is long, occasion fugitive, experience fallacious and judgment difficult (iv, 458-9).

Where the physician can do no good, let him do no harm (ii, 634-71).

Natural forces within us are the true healers of disease (v, 314-15).

To do nothing is sometimes a good remedy (iv, 172-3).

The art of medicine consists in three things, the disease, the patient and the physician. The physician is the servant of the art and the patient must combat the disease along with the physician (ii, 636-7).

Science begets knowledge, opinion ignorance (iv, 642-3).

Timidity shows want of power, temerity want of art (iv, 640-641).

For extreme diseases, extreme remedies (iv, 462-3).

Medicine originated througn sheer necessity, for the sick did not, and do not, profit by the same régime as the healthy (i, 572-3).

I also maintain that clear knowledge of natural science can be acquired from medicine alone (i, 620-621).

An important phase of medicine is the ability to appraise the literature correctly (iii, 100-103).

In the cities, medicine is the only calling in which errors are penalized by disgrace alone, and that does not hurt those who are familiar with it (iv, 638-9).

In athletes, extreme stoutness is dangerous (i, 3).

Use strengthens, disuse enervates (iii, 324-5).

Use and wont insure the best manual training (vi, 90).

Nature needs no instruction (ix, 112-13).

The human soul develops up to death (v, 314).

Nothing is ever lost [in nature], nor does anything originate which did not exist before (vi, 474).

For grave diseases, the most exact treatment is the most effective (iv, 462-3).

One must know to what diseases the natural disposition of the body inclines (v, 488).

Work is necessary to health (vi, 468).

Never work when hungry (iv, 474-5).

Let exercise come before meals (v, 314-15).

Bloodletting should be done in the springtime (iv, 592-3).

Sudden exertion is harmful to the sedentary (vi, 582).

Spontaneous lassitude indicates disease (iv, 470-71).

Overeating brings on illness, as shown by the treatment (iv, 474-5).

Fat persons are more exposed to sudden death than the slender (iv, 482-3).

Liquid diet is a better restorative than the solid (iv, 472-3).

Light diet is indicated at the height of an acute disease (iv, 464-5).

Insensibility to great pain shows that the mind is affected (iv, 470-71).

The lethargic have slow pulse (v, 610-11).

Those who swoon frequently, and without apparent cause, are liable to die suddenly (ii, 41).

A brusque answer from a modest patient is a bad sign (v, 522-3).

Autumn is bad for consumptives (iv, 490-91).

Labored sleep in any disease is a bad sign (iv, 470-471).

Sleep following upon delirium is a good sign (iv, 470-71).

Rain waters are naturally the best, but they need to be boiled and purified from foulness (ii, 36-37).

Observe head wounds from a distance and without touching them (ii, 21).

When life was seen to ooze away in wounded people, the blood was naturally mistaken for the soul of man (vi, 40-41. Æneid, ix, 349).

There should be no dressing for wounds except alcohol, for in wounds, the dry state approximates to the healthy and the moist to the unhealthy (vi, 400-401).

Of simultaneous pain in two places, the lesser is obliterated by the greater (iv, 482-3).

What drugs do not heal, surgery heals; what the knife does not heal the cautery heals; what the cautery does not heal is incurable (iv, 608-9).

Spasm supervening upon a wound is dangerous (iv, 532-3).

As a rule, the outward appearance and characteristics of people are an effect of their native soil (ii, 90-91).

Change of climate is endurable in chronic diseases (v, 318-19).

Most Scythians become impotent, do women's work, live and converse like women (i, 76-77).

Gout in young men comes only from sexual dissipation (vi, 30).

Old persons have fewer diseases than the young but chronic diseases never leave them (iv, 480-83).

Fasting is most easily endured by old people, next by adults, next by the young people and least of all by children, particularly the most lively (i, 13).

Prognosis is uncertain in acute diseases (iv, 474-5).

Spinal deformity often coexists with cough and tubercle of the lungs (iv, 180-81, 574-75).

The incidence of phthisis is commonly between the ages of 18 and 35 (iv, 534-5).

For hysterical maidens, I prescribe marriage, for they are cured by pregnancy (viii, 468).

Hiccough disappears upon sneezing (iv, 566-7).

The breathing (of Philiscus) was rare and large, like that of a person recollecting himself (ii, 684-5).

Diarrhœa in phthisis is bad (v, 14).

Epistaxis in amenorrhea is good (iv, 544-5).

Hardening of the liver in jaundice is bad (iv, 574-5).

If a convalescent eats heartily, yet does not take on flesh, it is a bad sign.

I have never seen people over fifty recover from renal disease (v, 344).

Concussion of the brain is always accompanied by loss of speech (vii, 58)?

Wine is not good in delirium (vi, 218-19).

Good wine will dissipate hunger (iv, 476-7).

Honey and wine were made exquisitely for men, if taken at the proper time and in just measure (vi, 270-71).

An intelligent person must know how to help himself in disease, bearing in mind that health is the highest good of man (vi, 86, 87, 208-9).

Things sacred should be imparted to sacred persons only; and it is not lawful to impart them to the profane until they have been initiated into the mysteries of the science (iv, 642-3).

Aristotle is interesting as the standard-bearer of the Hippocratic tradition that from medical reasoning came the principles of scientific method. As the greatest biologist of antiquity, he illustrates the remarkable aptitude which physicians have continually displayed in sciences other than the medical.

Aristotle

It is the business of a scientist to know the causes of health and disease, whence it follows that most scientists regard medicine as the goal of their studies, while physicians who practice in a scientific manner begin the study of medicine with natural science (*Æsthetics,* Introduction).

Conscientious and careful physicians allocate causes of disease to natural laws, while the ablest scientists go back to medicine for their first principles. (*Æsthetics,* Terminal).

The ablest physicians attach most importance to an exact knowledge of the human frame. (*Nichomachean Ethics,* i. 13).

To cure oneself by the book is bad and an experienced physician far preferable. For he acts not from personal views or any thing unreasonable, but heals the patient and expects to be paid for it. Politicians, acting from personal likes and dislikes, mistrust doctors as likely to compass their deaths

in the service of enemies and so they prefer healing out of books. The physician himself, if sick, actually calls in another physician, knowing that he cannot reason correctly if required to judge of his own condition while suffering. (*De Republica,* iii, 16).

Very important for the conduct of a life devoted to science are the views of Aristotle in his three treatises on ethics. In the Nichomachean Ethics, the reasoning is as follows:

Human good is happiness. The highest happiness lies in divine wisdom. Human happiness turns upon practical prudence and virtue. Pleasure lies in activity (motion) and is a physical state turning upon activity of the soul. The soul is rational and irrational. Moral virtue is rational when irrational desires are subjected to reason. Intellectual virtues are two: practical deliberation (prudence, common sense) and scientific speculation (wisdom).

In the Eudemian Ethics, good fortune is irrational and continuous (divine impulse) or discontinuous (deliberate action); gentility is the control of desire by reason for the sake of honor.

In the *Magna Moralia*, good fortune becomes lawless nature (*aloges physis*), but to the gentleman, really good things are good, really honorable things honorable.

Consciously or unconsciously, the following were literally the leading motives in the blameless lives of such great physicians and biologists as Harvey and Malpighi, Darwin and Huxley, Johannes Müller and Helmholtz, Claude Bernard and Pasteur:

Happiness, then, stands not in amusement; in fact, the very notion is absurd of the end being amusement, of one's toiling and enduring hardship all one's life long with a view to amusement alone . . . but to amuse oneself with a view to steady employment afterwards, as Anacharsis says, is thought to be right; for amusement is restful, and men want rest because unable to labor continuously. (*Nichomachean Ethics,* x, 6).

Now, he who works in accordance with, and pays observation to pure intellect, and tends this, seems likely to be in the best frame of mind and dearest to the Gods; for if, as we think, any care is given to things human by the Gods, it must be reasonable to suppose that they take pleasure in what is best and most akin to themselves (and this must be pure intellect); and that they requite with kindness those who love and honor this the most, as paying observance to what is dear to them, and as acting rightly and nobly. And it is quite obvious that the man of science chiefly combines all

these; he is therefore dearest to the Gods, and it is probable that he is at the same time most happy. Thus, on this view also, the man of science will be most happy. (*Nichomachean Ethics*, x, 8).

Celsus is best appreciated in full length excerpts. The following sentences, selected and arranged by A. Védrènes, a medical officer in the French Army, reveal the literary quality of this great text, but show no great advance over Hippocrates.

CELSUS

Greek medicine once comprised three kinds, *viz.*, one dealing with cures by food (Dietetics), the second with drugs (Pharmaceutics), the third by operation (Surgery). Proœmium.

The art of healing has no more solid base than experience. Proœmium.

Other things being equal, a friend as physician is better than a stranger. Proœmium.

Medicine is a conjectural art which is sometimes supported by neither theory nor practice. Proœmium.

Appreciation of the cause sometimes puts us on the track of the remedy. Proœmium.

The art of medicine has almost no constant rule. Proœmium.

Transition from a safe to a harmful climate, or *vice versa*, is not without danger (i, 3).

Changes in one's mode of life should be made gradually (i, 3).

An idle existence is hazardous, for some day one may have to work (i, 3).

Change of occupation may be fatiguing, and is remedied by resuming one's original employ (i, 3).

Always aid the organ which suffers most (i, 3).

There are some individual constitutions, of which nothing may be predicted without knowing them (ii, 2).

We should not impute the faults of the physician to his art (ii, 6).

Better an untried remedy than none at all (ii, 10).

For major ills, major remedies (ii, 11).

Nothing helps indisposition so much as an opportune diet (ii, 16).

There is no recovery which does not owe more to good fortune than to art, whence medicine is helpless where Nature withholds her aid (iii, 1).

It is more excusable for a physician to fail in acute than in chronic diseases (iii, 1).

Asclepiades said that the physician should heal safely, promptly and agreeably (iii, 4).

Boldness often wins, where prudence fails (iii, 9).

There are four diagnostic signs of inflammation: redness and swelling, heat and pain (iii, 10).

The doctor's perseverance often triumphs over the disease (iii, 12).

If the illness is grave, a true phthisis, it should be combatted immediately, for once established, it is not easily subdued. If strength permits, a change

of air by a sea-voyage may be tried, say from Italy to Alexandria . . . Milk is also very proper to take (iii, 22).

Extreme peril authorizes many measures which should be rejected under other circumstances (iii, 18).

Only a charlatan will exaggerate the gravity of an insignificant ailment in order to puff his own importance (v, 26).

In medicine, rules may be absolute, but consequences are variable (vi, 13).

Better a ray of hope than abject despair (vii, 16).

Why should a remedy be certain because it is unique? (vii, 23).

Frivolous minds, possessing nothing, sacrifice nothing; but a great genius honors itself by admitting error, particularly when with the object of forwarning posterity as to the mistakes of predecessors (viii, 4).

Galen was not remarkable for concision, indeed, was often "inebriated with the exuberance of his own verbosity." His *longueurs* are nowise the "heavenly lengths" which Schumann found in the divine music of Schubert, but are frankly boresome. A few sentences will suffice to show him at his best:

Galen

Nature did not consider size or shape in varying the structure of organs, nay, structure was determined by difference of function and function is regulated by essential utility. *De usu partium,* vi, 9.

The physician is Nature's assistant. *De humoribus,* i.

Most physicians are like athletes who aspire to victory in the Olympic games without doing anything to deserve it; for they praise Hippocrates as first in the art of healing but make no attempt to resemble him. *Medicus Philosophus.*

He who cannot classify diseases as to genera and species will be deceived as to therapeutic indications. *Ibid.*

There are three sentences of the Alexandrian Herophilus which have made their fortune. The first, showing just what it means for a human being to lose his health, was cleverly versified by the English poet Gay, and is, in effect, the very *raison d'être* of medicine.

Herophilus

To lose one's health renders science null, art inglorious, strength effortless, wealth useless and eloquence powerless.

Medicines are nothing in themselves, if not properly used, but the very hands of the gods, if employed with reason and prudence.

He who can discriminate between the possible and the impossible is the wisest physician.

The following sentences, translated by Dr. John D. Comrie (Edinburgh) from the *Regimen Sanitatis*, illustrate the practical dietetic wisdom of the School of Salerno:

Do you wish to be strong and healthy: then shed anxious cares, hold it vulgar to be angry (*irasci crede profanum*), be sparing of wine, sup in moderation, let it not seem useless to rise after a feast, avoid the noonday nap, retain no urine, be not costive. Observe these well and you will live long. Failing doctors, let these three be your doctors: a joyous disposition, rest, a well-regulated diet.

The quaint couplets of Ambroïse Paré illustrate the knack of terse, practical counsel which usually characterizes the surgeon:

PARE

Better a tried remedy than a new fangled one.
Those who work hard escape many kinds of infirmities.
Always give the patient hope, even when death seems at hand.
When youth is wakeful and old age drowsy, death is nigh.
To bed is best for foot, leg or thigh trouble.
When gangrene is pronounced, nothing will help but the knife.
I dressed him: God healed him.

A few sentences from Sydenham will convey his quaint literary quality, and these contain some of his basic ideas:

SYDENHAM

The art of medicine is to be properly learned only from its practice and exercise.

Nature, in the production of disease, is uniform and consistent, so much so, that for the same disease in different persons, the symptoms are for the most part the same; and the selfsame phenomena that you would observe in the sickness of a Socrates, you would observe in the sickness of a simpleton.

A disease, however much its cause may be adverse to the human body, is nothing more than an effort of Nature, who strives with might and main to restore the health of the patient by the elimination of the morbific humor.

Fever itself is Nature's instrument.

The generality have considered that disease is but a confused and disordered effort of Nature, thrown down from her proper state and defending herself in vain.

Simply to enumerate all the symptoms of hysteria would take a long day, so many are they. Yet not more numerous than varied, proteiform and chameleonlike.

Gout, unlike any other disease, kills more rich men than poor, more wise men than simple. Great kings, emperors, generals, admirals and philosophers have all died of gout.

A man is as old as his arteries.

The *lues venerea* was introduced into Europe A. D. 1493 from the West Indies, it being, before that time, unknown, even by name. Hence the disease is usually considered as endemic to the American colonies. In my mind, however, it is rather referable to the coast of Guinea, or to some portion of the Negro country thereabout. . . . The African disease is called yaws.

It is not without reason that Aristotle has observed that melancholy men are men of highest genius.

Dabblers in science lean upon the opinion of the vulgar and so have things their own way, whilst closer observers are received with calumny and ill words. Such, however, they bear with equanimity, satisfied with the approval of a wise minority.

As, indeed, no man can say who it was that first invented the use of clothes and houses against the inclemency of the weather, so also can no investigator point out the origin of medicine, mysterious as the source of the Nile. There has never been a time when it was not.

The great physicians of the 18th Century were more remarkable for sustained elegance of diction and conventional views of things than for aphoristic wisdom. It is convenient to take a long jump to a group of medical men who, about the middle of the 19th century, stated, in clear and unmistakable terms, the ideas which were to be the point of departure of scientific medicine, namely, Virchow, Helmholtz, Claude Bernard and Huxley. In a small pamphlet of 1849 Virchow [4] announced radical and very startling doctrine. In his later utterances, he is more the sceptical man of the world, experienced in practical politics and of extraordinary versatility.

VIRCHOW

Science in and for itself is nothing, and only becomes something through its promoters, the people. The phrase "science for its own sake" smacks of that inhuman viewpoint in which man regards his soul as the ultimate reality, as his essential existence, manifesting itself as a spirit striving to obtain a corporeal existence.

The touchstone of true science is power of performance, for it is a truism that what can, also will, and thus attains to real existence.

[4] Virchow: *Die Einheitsbestrebungen in der wissenschaftlichen Medicin*, Berlin, 1849.

What is dark and incomprehensible attracts some minds more than what is clear and understandable.

As long as vitalism and spiritualism are open questions so long will the gateway of science be open to mysticism.

Belief begins where science leaves off and ends where science begins.

Belief cannot be reckoned with in terms of science, for science and faith are mutually exclusive.

The task of science is not to attack the objects of belief but to stake out the limits of the knowable and to center consciousness within them.

Spontaneity of thought and freedom of will, as characteristics of our species, are illusions of human pride; for even savages know that, from birth on, there is naught but unconscious reflexes and instincts. [5]

Humanism is neither atheistic nor pantheistic, since it has but one formula for things unknowable, namely: I do not know.

Anthropomorphism is the attempt to reduce philosophic dualism to unity and this *anabasis* commonly follows the familiar pathway of unscience, that of analogy: Its postulates are God as a magnified man and the attribution of infinite dimensions to the human mind.

From the basic error that specific remedies were created for particular diseases came the notion that the whole course of a disease, or even its separate stages, could be annihilated by a single remedy. It was reserved for the ablest physicians of all time to perceive that identical remedies are good only for identical phases of different diseases and that for different phases of the same disease, different remedies are necessary.

Should medicine ever fulfill its great ends, it must enter into the larger political and social life of our time; it must indicate the barriers which obstruct the normal completion of the life-cycle and remove them. Should this ever come to pass, medicine, whatever it may then be, will become the common good of all. It will cease to be medicine and will be absorbed into that general simplified body of knowledge which is identifiable with power. Then will Bacon's prediction be accomplished fact: What seemed causal in theory will become established rule in practice. [6]

Medicine loses none of its worth in shedding the cothurnus and mixing with the people, for whom it acquires new powers.

Physicians are the natural attorneys of the poor and no small part of social problems come under their jurisdiction.

We have not crushed the power of monarchy and the *Junker* in order to elevate a sleek *bourgeoisie* on the shield.

I justify a place in pathology for the leucocytes.

I stand upon my own rights and for that very reason concede rights to others.

Brevity in writing is the best insurance for its perusal.

The conjunction "and" commonly serves to indicate that the writer's mind still functions even when no signs of the phenomenon are noticeable.

[5] This is, of course, the essence of behaviorism.

[6] Here Virchow states very clearly the present unattainable ideals of "social medicine."

Marriages are not normally made to avoid having children.

Has not science the noble privilege of carrying on its controversies without personal quarrels?

Imprisoned quacks are always replaced by new ones.

Laws should be made, not against quacks but against superstition.

If popular medicine gave the people wisdom as well as knowledge, it would be the best protection for scientific and well-trained physicians.

Physicians can only be called such when the ultimate aim of their labors is the healing of disease.

But once we have recognized that disease is naught else than the course of vital processes under altered conditions, the concept of healing expands to imply the maintenance or reëstablishment of the normal condition of existence.

Even in the hands of the greatest physicians, the practice of medicine is never identified with scientific (laboratory) medicine, but is only an application of it.

When we have exact knowledge of the conditions of existence of individuals and of peoples, then only will it be possible for the laws of medicine and philosophy to gain the credence of general laws of humanity. Then will the Baconian "knowledge is power" become reality.

After serving as a medical officer in Prussian barracks, where he wrote his epoch-making tract on the Conservation of Energy (1847), Helmholtz abandoned medicine for a brilliant career in mathematical physics. He confirms, in most glowing terms, the view of Hippocrates and Aristotle that medical training, and the kind of reasoning which the physician employs in practice, will also fit the mind for work in the most abstruse branches of pure science. In the entire history of medicine and science, he is the most striking exemplar of this fact.

HELMHOLTZ

But I look back upon my medical studies as the school which taught me, in a more penetrating and convincing way than any other, the eternal principles of scientific work, principles so simple yet continually forgotten, so clear and yet ever shrouded by a deceptive veil.

Medicine was once the intellectual home in which I grew up and even the emigrant remembers and is best remembered by his native land.

To an old student like myself, the once familiar, somewhat matronly visage of Dame Medicine is barely recognizable, so fresh and vivacious has she become in the rejuvenating spring of natural science.

For him who has to cope with the hostile forces of reality, indifference and romance disappear; what he really knows and can do is put to severe

tests; he must see everything in the hard, clear light of factual experience and can no longer lull himself in agreeable illusions.

Individuals, as well as nations, who wish to rise to the height of manhood must learn to look reality in the face, if it is to be bent to the purpose of the mind. To flee into an ideal world is a false resource of transient success; it only facilitates the play of the adversary, and when knowledge only reflects itself, it becomes unsubstantial and empty, or resolves itself into illusions and verbiage.

The Critique of Pure Reason is a continual sermon against the use of the category of thought beyond the limits of actual experience.

Whoever desires to give his hearers a perfect conviction of the truth of his principles must, first of all, know from his own experience how conviction is acquired and how not. He must have known how to acquire conviction where no predecessor has been before him, i.e., he must have worked on the confines of human knowledge and have conquered for it new territory.

A teacher who retains convictions foreign to himself is all well enough for pupils who depend upon authority as the source of their knowledge, but not for such as require basic convictions of the utmost depth.

It was said of Claude Bernard that he was not so much a physiologist as "physiology personified" (*la physiologie même*). His *Introduction to the Study of Experimental Medicine*, recently translated by Henry Copley Greene (New York, 1927) is the breviary of laboratory workers in this field, of which Bernard himself was, in a very large and real sense, the founder. Never have the working principles of laboratory medicine been stated with such convincing precision as in these luminous sentences.

Claude Bernard

Observation is a passive science, experimentation an active science.

Cuvier expressed the same thought by saying: "The observer listens to Nature; the experimenter questions and forces her to unveil herself."

Pathology includes real experiments which are spontaneous, and not produced by physicians.

Man is naturally metaphysical and arrogant, and is capable of believing that the ideal creations of his mind, which express his feelings, are identical with reality; whence it follows that the experimental method is not naturally a primary appanage of man. It is only after long courses of error in theological and scholastic discussions that he finally acknowledges the sterility of his efforts along these pathways.

In science, the thing is to modify and change one's ideas as science advances.

The science of life is a superb and dazzlingly lighted hall which may be reached only by passing through a long and ghastly kitchen.

Our ideas are only intellectual instruments which help us to penetrate phenomena. We should drop them when they have served their turn, even as one scraps a bistoury grown rusty from long usage.

All natural philosophy is summed up in these terms: to know the laws governing phenomena. Every experimental problem reduces itself to this: to foresee and direct the course of phenomena.

Science repulses the indefinite.

Astronomers limit themselves perforce to observation, as they cannot go to the skies to experiment on the planets.

True science teaches us to doubt and to abstain from ignorance.

A scientific hypothesis is merely a scientific idea, preconceived or previsioned. A theory is merely a scientific idea controlled by experiment.

At first, we feel and believe that absolute truth is ours by right, but study will soon dispel these illusions bit by bit.

Science increases our power in proportion as it lowers our pride.

If I had to define life in a word, it would be: Life is creation.

In pathology, as in physiology, the true worth of an investigator consists in pursuing not only what he seeks in an experiment, but also what he did not seek.

The names of the prime movers of science disappear gradually in a general fusion and the more a science advances, the more impersonal and detached from the past it becomes.

In the arts and literature, personality is everything, for these are spontaneous creations of the mind and have nothing to do with the statement of natural phenomena, in which the mind should not create anything. The past maintains its value through these creations of art and letters. A modern poet has characterized the personality of art and the impersonality of science, as follows: Art is I: Science is We.

The investigator should have a robust faith and yet not believe.

Put off your imagination as you take off your overcoat, when you enter the laboratory; but put it on again, as you put on your overcoat, when you leave the laboratory.

When it is said that great thoughts come from the heart, it means that they come from the feelings, for our feelings, which have their physiological origin in the nerve-centers, act upon the heart like peripheral sensations.

A fact is nothing in itself. It avails only by the idea attaching to it or by the proof which it furnishes.

Man can learn nothing unless he proceeds from the known to the unknown.

We have in our minds an intuition or feeling as to the laws of Nature, but we do not know the form. We can learn it only by experiment.

We usually give the name of discovery to recognition of a new fact, but the idea connected with the fact is, in my opinion, what really constitutes the discovery. Facts are neither great nor small in themselves. A great discovery is a fact whose appearance in science gives rise to shining ideas, whose light dispels many obscurities and shows us new paths.

A discovery is generally an unforeseen relation not included in theory, for otherwise it would be foreseen.

It has often been said that to make discoveries, one must be ignorant . . . . by which is meant that it is better to know nothing than to cherish fixed ideas based on theories whose confirmation we constantly seek, while neglecting everything that fails to agree with them.

We must never make experiments to confirm our ideas, but simply to control them.

The truly scientific spirit should make us modest and kindly. We really know very little and are all fallible in facing the immense difficulties presented by investigation of natural phenomena. United effort is better than to divide and nullify by personal disputes.

The doubter is a true man of science: he doubts only himself and his interpretations, but he believes in science.

Some physicians fear and avoid counterproof; as soon as they make observations confirming their ideas, they refuse to look for contradictory facts, for fear of seeing their hypothesis vanish.

When we begin to base our opinions upon medical fact, on inspiration or on more or less vague intuitions about things, we are outside of science and are exemplars of that fanciful method fraught with greatest dangers, in that the health and life of the patient turn upon the whims of an inspired ignoramus. True science teaches us to doubt and, in ignorance, to refrain.

The uncompromising agnosticism of the youthful Virchow was maintained with breezy, jocund vigor by Huxley, the ablest English prose-writer of his time.

Huxley

The man of science has learned to believe in justification; not by faith, but by verification.

Ecclesiasticism in science is only unfaithfulness to truth.

Science commits suicide when it adopts a creed.

The world is neither wise nor just, but it makes up for its folly and injustice by being damnably sentimental.

Orthodoxy is the Bourbon of the world of thought. It learns not, neither can it forget.

Science is, I believe, nothing but *trained and organized common sense*, differing from the latter only as a veteran may differ from a raw recruit.

A detective policeman discovers a burglar from the marks made by his shoe, by a mental process identical with that by which Cuvier restored the extinct animals of Montmartre from fragments of their bones.

Education is the instruction of the intellect in the laws of Nature, under which name I include not merely things and their forces, but men and their ways.

Next to being right in this world, the best of all things is to be clearly and definitely wrong, because you will come out somewhere. If you go buzzing about between right and wrong, vibrating and fluctuating, you come out nowhere.

If a little knowledge is dangerous, where is the man who has so much as to be out of danger?

Most of the faults and mistakes of the ancient philosophers are traceable to the fact that they knew no language but their own, and were often led into confusing the symbol with the thought which it embodied.

Whatever practical people may say, this world is, after all, absolutely governed by ideas, and very often by the wildest and most hypothetical ideas.

Men can intoxicate themselves with ideas as effectually as with alcohol or bang, and produce by dint of intense thinking, mental conditions hardly distinguishable from monomania.

The living voice has an influence over human action altogether independent of the intellectual worth of what it utters.

It is better for a man to go wrong in freedom than to go right in chains.

Comparable with the aphorisms of Claude Bernard on the approaches to experimental medicine are those of Charcot on the bedside approach to disease. The essence of his teaching was, in fact, the doctrine of the spontaneous approach and the danger of preconceived ideas.

CHARCOT

To learn how to treat disease, one must learn how to recognize it. The diagnosis is the best trump in the scheme of treatment.

In dealing with a nervous patient, you should regard the malady before you merely as an episode. Thus, in a case of chorea, it is only necessary to inquire how long it has existed. The condition of the patient is only an accident in the history of the disease, just as each of us is only an accident in the history of humanity.

Clinical medicine is made up of anomalies, while nosography is the description of phenomena that occur regularly. What we look for in the clinics is almost always exceptional; what we study in nosography is the rule. It is well to know that, in the practice of medicine, a nosographer is not always a clinician.

Claude Bernard said: We must not subordinate pathology to physiology but the other way around. We must first pose our problem from the actual data of clinical findings and then attempt to give a physiological explanation. To do otherwise is to lose sight of the patient and to distort our conception of the disease.

If the clinician, as observer, wishes to see things as they really are, he must make a *tabula rasa* of his mind and proceed without any preconceived notions whatever. Magendie, we are told, advised the laboratory experimenter to proceed aimlessly. I am almost prepared to recommend this method to the clinical observer.

In the last analysis, we see only what we are ready to see, what we have been taught to see. We eliminate and ignore everything that is not a part of our prejudices.

It is the mind which is really alive and sees things, yet it hardly sees anything without preliminary instruction.

Disease is from of old and nothing about it has changed. It is we who change, as we learn to recognize what was formerly imperceptible.

How is it that, one fine morning, Duchenne discovered a disease which probably existed in the time of Hippocrates?

Why do we have to go over the same set of symptoms twenty times before we understand them? Why does the first statement of a new fact always leave us cold? Because our minds have to take in something which deranges our original set of ideas, but we are all like that in this miserable world.

There is, in any well executed description of disease a remarkable power of transmission. If made at the right time, it will penetrate even the least prepared minds. What had hitherto remained in the womb of nothingness has begun to live. A description of a hitherto unknown species of disease is an event, a very great event, in pathology.

In medicine, even the most stoical intelligences have not been able to confine themselves to simple statement of fact; there is always the tendency to bring facts into relation with some theory or other. It appears to be a necessity of the human mind.

Allbutt's teaching, already set forth at length in these pages,[7] took another line, namely that, in clinical medicine, we should never confuse the symbol (the name or fictive concept of the disease) with the real thing (the patient before us):

ALLBUTT

In medieval times, so fastidious were logic and abstraction that practice became a vulgarity, and he was the greatest teacher who carried his pupils furthest from things.

Medicine likewise, because it deals with things, has always been for our serener circles a Cinderella, blooming maid as happily as she has grown nevertheless.

We find, in ruling classes, and in social circles which put on aristocratical fashions, that ideas, and especially scientific ideas, are held in sincere aversion and in simulated contempt.

The Greek was an individualizing and an emancipating spirit, the medieval collective and enthralling—a genius of assemblies and associations of men.

In science, law is not a rule imposed from without, but an expression of an intrinsic process. The laws of the lawgiver are impotent beside the laws of human nature, as to his disillusion many a lawgiver has discovered.

We are led to think of diseases as isolated disturbances in a healthy body, not as the phases of certain periods of bodily development.

The name of a disease is not, as it is continually regarded, a thing.

[7] *Bull. New York Acad. Med.*, 1926, 2. s., ii., 491-501.

Diseases are not even species, such as cats and toads, but abnormal, though not altogether irregular behavior of animals and plants.

Finally, we come to a group of physicians who, like Huxley, have acquired the tolerant, ironic comprehension of the man of the world, who frequently express their views of things with the point and pungency, the sting and tang of epigram. One of the earliest of these was the great medical scholar, Karl Friedrich Heinrich Marx, whom Rohlfs (to whom Marx left his fortune) called "Marx the only":

Marx

That is the best country which has the fewest diseases, laws and crimes.

He who says more than he sees and hears, sins against nature, since he has two eyes, two ears and only one mouth.

If superstition were curable, the remedy for it would long since have been found; were it mortal, it would long since have been buried.

More than the hand is the tongue the organ which can do most good and evil.

In nature, those who cry out with pain and those who prescribe remedies therefor are different persons: in politics, they are one and the same.

If an author's books die with him, it shows them to be parasites, which survived only through him, with no independent life of their own.

In actual life, pious churchgoers may show up as deceitful tricksters and theorizing physicians as blind empirics.

Physicians see many "diseases" which have no more real existence than an image in a mirror.

Neurotics and psychotics see, hear and smell things which do not exist. Official investigators, similarly afflicted, seem to be perfectly normal.

A masked gout is easier to penetrate than a mask of virtue.

That fear induces weakness and sickness is better demonstrated by a devastating epidemic than by moral philosophy.

Medicine heals doubts as well as diseases.

The individualized physician is, in the truest sense, a man of the world.

In this genre, Osler excelled, apart from his larger utterances on medicine, familiar to all in Dr. Camac's collection:

Osler

In all things relating to disease, credulity remains a permanent fact, uninfluenced by civilization or education.

From Hippocrates to Hunter, the treatment of disease was one long traffic in hypotheses.

One of the most delightful sayings of antiquity is the remark of Heraclitus about his predecessors, that they had much knowledge but no sense.

The quest for righteousness is Oriental; the quest for knowledge Occidental.

We doctors have always been a simple trusting folk. Did we not believe Galen implicitly for 1500 years and Hippocrates more than 2000?

Is there anything more doleful than the procession of four or five doctors into a patient's room?

Fully half of the quarrels of doctors are fomented by the tittle-tattle of patients.

Feminae medicorum tubae is an old and true saying.

Common sense in medical matters is rare and is usually in inverse ratio to the degree of education.

Fevered haste is not encouraged in military circles . . . and if you will adapt your intellectual progress to army rules . . .you will acquire, little by little, those staying powers without which no man is of much value in the ranks.

In the same trend were Weir Mitchell and Jacobi, both men of large mental mould and professional ideals of the highest order.

Weir Mitchell

The success of a discovery depends upon the time of its appearance.

The true rate of advance in medicine is not to be tested by the work of single men, but by the practical capacity of the mass.

The truer test of national medical progress is what the country doctor is.

I can remember when older physicians refused to recognize socially a man who devoted himself to the eye alone.

All the vast hygienic, social and moral problems of our restless, energetic labor-saving race are, in some degree, those of the future student of disease in America.

You know alas! that we now use as many instruments as a mechanic, and that however much we may gain thereby, our machines are not labor-saving. For unless men keep ahead of their instrumental aids, these, to coin a word, will merely dementalize them.

How Sydenham dealt with the neurasthenic politicians of his time is interesting reading for those who believe that the American, in his desire for novelty, invented neurasthenia. As for gout, this great master and Mead knew as well how to treat it as we do, for here the laboratory has taught us nothing as yet of helpful utility.

Ever since the Crimean war, nurses have been getting into novels.

While I can understand the patient falling in love with the nurse, I do not as easily comprehend the nurse falling in love with the sick patient. . . . One reluctantly feels the need to change the nurse, which sad necessity I have known to interfere with some promising love affairs.

Do not think too much of the dignity of your profession or what it is beneath you to do. It is a moral disorder of young nurses and, I may add, of young doctors.

A club of men and women was proposed in London a few years ago. It was made of advanced women and of men. It was in an unhappy moment called "The Middlesex Club." That killed it. I do not fancy a middle-sex.

JACOBI

Treat the man who is sick and not a Greek name.

Do not blame bacteriology for the sins of some few workers.

Nature does not kill and does not heal. If there were consciousness in Nature, she would feel indifferent about what she is, *viz.*, mere evolution.

The magnetic needle of professional rectitude should, in spite of occasional deviations, always point in the direction of pity and humanity.

When old ladies believe in the efficacy of hot chamomile tea, no matter whether they mean Roman or vulgar flowers, in fever and in belly-ache, you hope that not many of that class of old ladies are left. I have survived them.

The Siamese twins were carried over 50,000 miles, but I am sure the only place they knew anything about was their South Carolina village.

This clear-eyed indulgence and tolerant irony, essential to the modern spirit, culminates in the *Charlas de Café* of the great Spanish neurologist Ramón y Cajal, whose scientific and literary achievement will require a separate chapter.

Apart from the larger aspirations and ideals of great physicians, aphorisms about medicine are to be approached with extreme caution and are best taken in small doses. Science cannot be reduced to a pocket formula, truth itself is sometimes an affair of shades of meaning and what is true in one latitude or period of time may even prove false or misleading in another. There are some clinical aphorisms, such as that of Sir William Jenner about pregnancy, which have created ghastly contretemps and brought eminent physicians into disgrace and criminal causes. Epigrams are often perpetrated at the expense of truth and it was written in Scripture that "with knowledge increaseth sorrow." Even "words of wisdom" are apt to be depressing, the dry husks which we would rather not chew if we could help it. I once sat in my lonely room, perusing the Maxims of Queen Christina of Sweden (who murdered Monaldeschi). A vigorous German of my acquaintance entering, seized the *bibelot* (my property) and hurled it

across the room, shouting: *Altjungferphilosophie!—verdammtes Zeug!* One marvels, in this connection, at the current view of poetry as a "burble" and the concern of continental Europe about "medical philosophy." In the sentences herein strung together, there is enough latent medical philosophy to furnish forth a thousand volumes; but as Alfred Noyes has said, with sovereign intelligence, "there is no precision of expression like the precision of great poetry." [8] As supreme modes of self-expression, great poetry and great music make the spirit to exult, the heart to expand and the mind to increase in power. There are poetic lines which express the fundamental ideas of science better than science itself, illustrating Sir James Barrie's dictum that "the scientific man is the only person who has anything new to say and who does not know how to say it." The poetic fragments of Empedocles contain a clear statement of the doctrine of Conservation of Energy, the essence of the humoral pathology, the popular theory of the determination of sex and even the rationale of the vegetable rennets or *présures,* which have latterly occupied the attention of French chemists:

> "But as when rennet of the fig-tree juice
> Curdles the white milk and will bind it fast."

The *Divina Commedia* of Dante summarizes the scientific knowledge of the Middle Ages. All that is valid in Freudian doctrine (ambivalence of emotion) is in the *odi et amo* of Catullus or the *Zwei Seelen* of Goethe. The *pectora caeca* of Virgil conveys Aristotle's doctrine of the heart as the seat of intelligence, while an English poet expresses, at once, Harvey's curious transfer of the intelligence from the heart to the blood and the basic notion in "behaviorism"—

> "Her pure and eloquent blood
> Spoke in her cheeks and so distinctly wrought,
> That one might almost say her body thought."

Of great medical men, Claude Bernard and Charcot, Allbutt and Osler, have, in particular, something of this

[8] In his review of the poems of the physiologist Sherrington. *Nature,* Lond., 1926, cxviii, 364.

heightened perception and luminous expression of things, the lift into the ampler aether, without which aphoristic wisdom of any kind is apt to seem a phase of *taedium vitae*.

In the practice of medicine, a single uttered word may suffice to blast a reputation or to poison the peace of a lifetime. Clinical teachers of the Frerichs or Neusser stamp, who are always proclaiming just how, where and why a patient is going to die, are very poor bedside doctors, and in no sense "healing physicians" (*Heilärzte*). What drives the people to quacks and irregular practitioners is the natural human feeling that one may get well after all, that "relief from suffering is an obtainable goal" and that "the best inspirer of Hope is the best physician." This is the *crux*, the present dilemma of socialized medicine and of laboratory medicine, or what the Germans call "guinea-pig medicine." Whether from the viewpoint of the *medico mentiri licet* or of the Hippocratic vow to silence (*Halt's Maul! Dummkopf!*), there is the wisdom of deep feeling in the monody of the Irish poet:

"The silliest charm gives more comfort to thousands in sorrow and pain,
Than they will ever get from the knowledge that proves it foolish and vain:
For we know not where we come from and we know not whither we go,
And the best of all our knowledge is how little we can know."

F. H. Garrison.

THE WESLEY M. CARPENTER LECTURE

THE PATHOLOGY OF THE AGING PROCESS

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In the very heyday of man's powers, in the full summer of his creative possibilities, and of his desires and ambitions, the life-drama played by each human actor discloses, quite suddenly and unexpectedly, its real tragicomic motive. It is, as if the player himself, had been enacting a part in a drama, the course and the end of which he did not fully comprehend. It had been a pleasant play of exciting incident, joyous adventure, vital desire and satisfaction, ambition and achievement. The actor has wantoned with his role to his own satisfaction, and now, well past the middle of the second act, he is shocked by a sharp hint from the prompter's box that his interpretation of his role must be changed into another key—one less pleasant, more difficult and unsatisfying. From now on to the end of the third act he must portray the picture of gradually flagging desire and failing powers, of disillusionment, fading pleasures and progressive fatigue, in other words, senescence, until his role ends in ultimate death. The title of this tragicomedy is "The Life of Man"; its three acts are entitled: I, Evolution; II, Maturity; III, Involution. It is the story of a living, multicellular organism—a chemicophysical machine transforming, storing and releasing energy—capable of building and restoring its own substance, and repairing its wear-and-tear damage within certain bounds, but only for a limited period of time. As is the case with all energy-producing machines, the life of the individual human machine is not immortal, but has, perforce, from the very nature of its substance and construction, the complexity and intricate

relationships of its manifold parts, and the peculiar nature of the work it has to do, a limited period of useful existence. The individual machine wears out; but before wearing out it has the power of producing out of its own substance and energy-store the materials for the creation of other machines of its own kind. Although mortal as an individual organism, it secures a potential immortality for its kind. It does this, however, at the price of its own self-destruction, for under normal conditions its duration of existence is determined by factors inherent within the machine itself.

The Nature of the Human Machine

We look upon the animal organism as a combustion apparatus which burns and transmutes inert materials into living protoplasm with the production of heat and vital energy. The manifestations of its work constitute the vital functions of nutrition and metabolism, motility, irritability and reproduction. The essential goal of its labor is the perpetuation and evolution of the species—the preservation, transmission and modification of the germ plasm. When this is assured or accomplished, the individual machine has served its purpose. Its duration of existence is determined, therefore, by the conditions and factors necessary to accomplish racial preservation and progress. Important among these factors are the length of the period preceding puberty, the duration of the reproductive period, and the length of time required for the postnatal care of the progeny. All of these factors are inherent within the germ plasm of the race; the individual's duration of life dependent upon such intrinsic factors is the normal or biologic span of life, and its termination constitutes *normal* or *biologic death*. But this is not the only form of death that may come to the multicellular animal organism, nor is it the usual one. Unfavorable factors in the environment may check the career of the individual at any time in its course—*pathologic extrinsic death*—the most common fate of animal life; or there may be present

inherent abnormalities in the germ plasm of any given line fore-ordaining its early or premature termination—*pathologic intrinsic death* (*inherited*). Very few, if any, human beings achieve a biologic span of life and a normal intrinsic death; the great majority succumb to a pathological extrinsic death, a smaller number to a pathologic intrinsic death.

Period of Evolution of the Human Machine

The life of the human individual created by the union of sperm and ovum consists of the relatively short intrauterine period of ten lunar months, and the much longer extrauterine period that may be extended over nine to ten

Fig. 1. The Beginning of the Play. (Infant 8 days old. After Stratz.)

decades, usually only seven or less. Both of these periods —the intrauterine as well as the extrauterine—represent a continuous progression from the beginning of the life of the individual to its end. This may be represented by a curve, the ascending portion of which is the period of growth (*evolution*), its apex a relatively short plateau of *maturity*, and the descending curve the period of retrogression (*involution*). The ascending curve of growth begins in intrauterine life from the moment of the first

division of the fertilized ovum, and shows two distinct periods, the embryonic and the fetal. The energy of growth of the fertilized egg is greater than that at any other period in the life of the given individual. During the second month the growth of the embryo is relatively greater than that from the period of birth to maturity; in the third month its growth equals relatively that of the first six years of extrauterine life; in the fourth month as much as in the first three years, and in the fifth month as much as in the first year after birth. This extraordinary energy of growth following fertilization consists chiefly in the production of cell-masses and their differentiation into the three germ-layers. By the end of the first month the embryo has passed through the most essential stages of its pre-human development, by the end of the second month it has attained well-defined human form, and in the third month its sex can be clearly recognized. This closes the germinal or embryonic period, and fetal growth and differentiation now proceed with a remarkable loss of growth energy. Not all organs and tissues grow at the same rate, and these differences determine bodily form and proportions.

After approximately 280 days the period of intrauterine life is completed, and with birth the individual enters upon his extrauterine period of growth and development which leads essentially to increase in height and weight. During this time also the differences in rate of growth bring about further changes in the bodily proportions. Within this period there occur also the development of the teeth, the conformation of the head and face, the ossification of the bones, and various changes in the viscera and soft tissues. The period of extrauterine evolution extends from birth to that of maturity or completed sexual ripeness. It will be seen from Figure 3 that this period shows also six well-defined subdivisions in which growth proceeds at varying rates and for different purposes of evolution: The period of the nursling's development, followed by the period of neutral infancy with its two cycles of stationary and accelerated growth, the first periods of turgor and

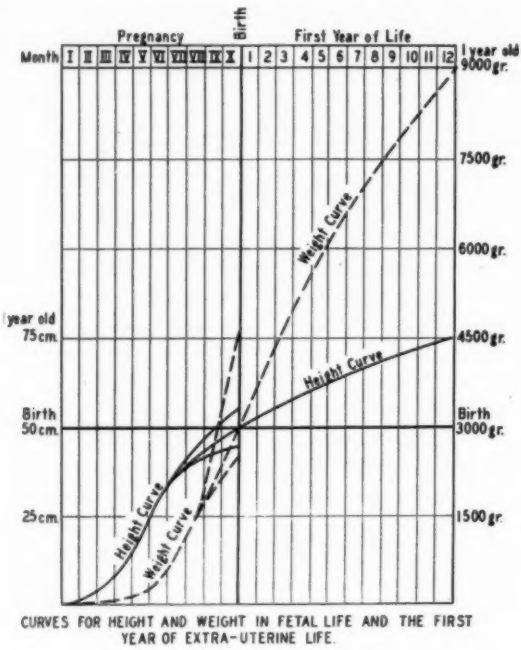
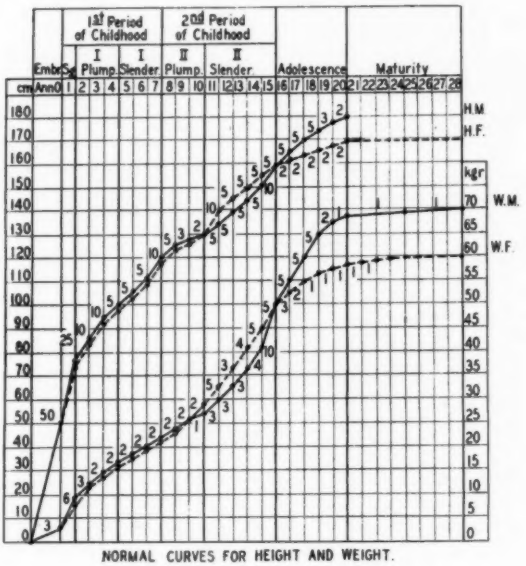


Fig. 2. (After Stratz.)

proceritas; then the bisexual period of childhood with also two distinct phases of growth, the second periods of turgor and proceritas, and finally the period of adolescence. After birth the growth-energy is strongest during the first year; height is increased about 50 per cent. and weight about 200 per cent., as shown by Figure 2. This preponderance of weight increase over height increase gives to the first year of life the greatest fullness and rotundity of body seen at any stage of life. In Figure 3 the normal height and weight curves for both sexes are shown up to the period of full development, 28 years for the male, and 24 years for the female. It will be seen that boys attain half of their total height by the end of the third year, while girls attain the same at the end of the second year. Half

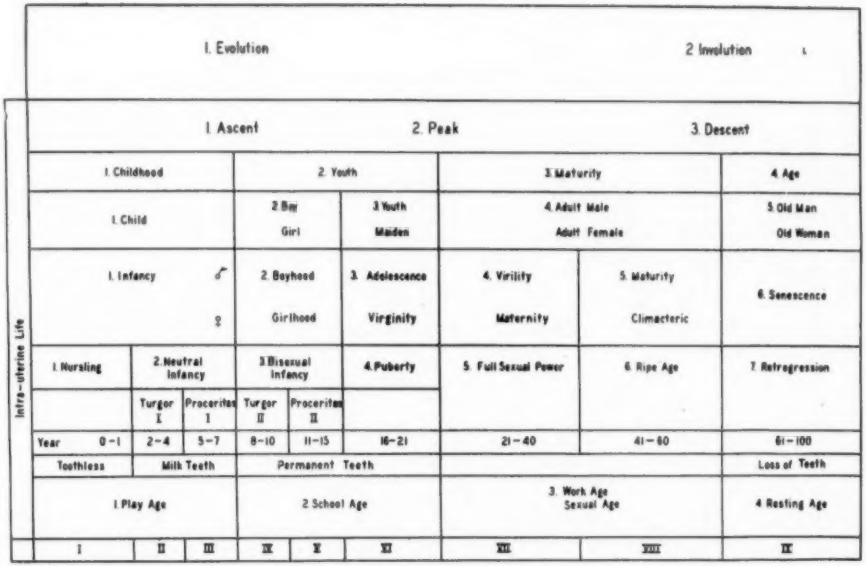
of the total weight for boys is attained in the 13th year, by girls in the 11th year. It is important to note that the extrauterine expenditure of growth energy does not progress uniformly, but in wave-like movements of retardation and acceleration. This may be roughly indicated as the 2-4, 5-7; 8-10, 11-15 year-periods, constituting the first



NORMAL CURVES FOR HEIGHT AND WEIGHT.

Fig. 3. (After Stratz.)

and second cycles of turgor and proceritas. From the 16-20th years the curves of growth for the boy become steeper, those for the girl gradually flatter. Both sexes become larger, fuller and more powerful. Complete maturity of growth, as evidenced by the flattening of the height-weight curves is usually attained by the male at 28 years of age, and by the female at 24 years, at these ages the *plateau of maturity or ripeness* is reached, and the vital energies of the organism are directed toward the business of *reproduction*. All of the energy-producing



THE STAGES OF LIFE

Fig. 4. (Altered and Adapted after Stratz.)

and expenditure from the fertilization of the ovum, through embryonic and fetal life, birth, and the six growth periods of extrauterine life have been apparently chiefly, or solely, for the attainment of this end, that the species shall not perish from the earth, but shall be renewed—with evolutionary modifications, we must surmise—or the whole process seems without reason.

We have taken the height-weight curves as the most striking and important indices of the period of evolution. Similar curves could be plotted for the growth of the individual organs and tissues. In each of the eight periods of growth that we recognize as constituting the whole period of evolution there are constant changes in bodily proportions taking place due to the unequal growth of the different organs and tissues. As a general rule the organs that show the greatest degree of growth in extrauterine life are those that were the least developed at birth. During the period of evolution the vital energy for growth is so strong that it exceeds that of the functional; at maturity the two are so balanced that cell destruction and cell growth are so equalized that repair is possible without loss of tissue elements. In Figure 5 the curves of functional development are shown for the different decades of life. Starting at birth the curve of nutrition and metabolism falls relatively as the body attains its development, and at the 20th year continues on a horizontal plane; the motility curve ascends proportionately to that of growth until the period of maturity, reaching its height during the third decade; the curve of reproduction remains neutral until the sharp rise at puberty and begins to fall at about 30, declining more rapidly than the functions of motility and nutrition. The curve of the cerebral and spiritual function ascends sharply, closely paralleling the curve of growth, but continues to ascend after this period is ended, beginning to fall at about the middle of the seventh decade. It is the only vital function that shows persistent evolution after the termination of the period of growth.

Period of Maturity

With the attainment of sexual maturity the peak of life is reached somewhere in the level plateau of the curves of growth between the 30th and 50th years. These boundaries are far from being fixed; the individual variations are great, and it is no more possible to say in what year the peak is reached than to determine the exact boundary between evolution and maturity or between maturity and regression. There is too much complicated interlocking of the vital processes, and the body machine is made of other smaller machines that vary in their periods of evolution and maturity. We may say that the peak is that point at which the vital energies make use of the food taken in to run and repair the machine without adding to its substance. Nevertheless, after the attainment of reproductive maturity some growth takes place exceeding the repair of loss of substance. According to some authorities the limit of height may not be reached until the 35-40th

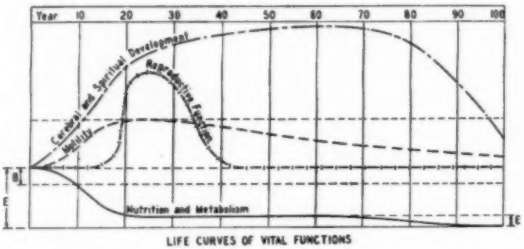


Fig. 5. (Based in part upon Stratz. Author's modification.)

year, and there is usually an increase in weight for both sexes during this period, largely due to an increase in the storage of fat and resulting from the disproportion between the fuel-intake and fuel-consumption. To what extent this increase in adipose tissue is physiological or due to the environment of modern civilization cannot be positively determined. Progressive ossification is also going on throughout this period; its significance may be that

of regression rather than of growth. Practically, therefore, maturity has been reached when an equilibrium between intake and replacement of old tissues without the formation of additional ones occurs. The period of maturity is the period of reproductive activity. Both sexes have completed their sexual developments and are now ready to carry out their greatest function, the propagation of their race; and the vital energies of this period urge them relentlessly to this consummation—the male to the activities of impregnating, protection of the female and his progeny; the female to her more strenuous sexual functions of ovulation and menstruation, pregnancy, birth, lactation, and the maternal care of the offspring. The age of sexual activity is also the creative and productive age, particularly for the male. The success of his life, his career in business or profession, his fullest mental and spiritual development, his happiness are more closely related to and dependent upon his management of his reproductive period than upon any other period of his life. If measured by fertility the high point of life falls somewhere between the 25th and the 37th years. The simple production of progeny, however, cannot be taken as the index to the highest point of life efficiency and achievement, because of the long postnatal period of care necessary for the preservation and evolution of human progeny. It is, therefore, more reasonable to assume that normally the peak of life extends into the fifth decade. (See figure 4.)

Period of Involution

When the object of the reproductive period has been achieved—when progeny has been secured and its independent existence secured, the mature carrier of germ plasm is no longer necessary in the scheme of evolution. Having fulfilled his biological duty, he must pass from the scene, and his withdrawal is brought about gradually and slowly through the involution of his energy-machine and the weakening of his vital functions. He must pass now through the regressive periods of senescence and old age until the final release is obtained through death. We are

now confronted with the mystery and problem of protoplasmic involution. But is it any stranger than that of protoplasmic evolution and progressive growth? Indeed, in the economy of the human energy-machine the two processes have been coexistent from the time of the fertilization of the ovum and the beginning of its cell-division. Throughout the whole period of development, both intra- and extrauterine, the regression or involution of temporary structures and organs has taken place; these served their purpose of usefulness for a certain time and disappeared during the ascent of the organism to its maturity. We need only mention the gill-slits, the placenta, umbilical cord, the ductus arteriosus, the umbilical vessels, the urachus, the milk teeth and the thymus among the various structures that undergo involution after the completion of their temporary functions. Especially remarkable is the life-history of the placenta. At the birth of the organism it is a senile structure repeating in detail much of the pathologic tissue-changes that later are to appear in the aging process of the mature organism: The sclerosis of arteries, fibrosis of stroma, atrophy and degeneration of the chorionic epithelium, necrosis of villi, thrombosis and calcification, all of this pathology of old age appears in this important vascular organ at the completion of intrauterine life. In the fulfillment of its function the placenta passes through well-defined stages of evolution, maturity and senescence and when its work is over it is discarded as useless and disappears from the scene of the individual life. Prophetic of the future fate of the organism as a whole!

The human mind accepts these localized organ- and tissue-involutions as reasonable and normal processes in the evolution of the human body; they excite no apprehension, no fears, no regrets; to the average uneducated individual they are wholly unknown. Quite different is the case with respect to the signs and manifestations of that major involution involving the organism as a whole. We regard the appearance of senescent signs as a tragic joke played upon us, which we resent more or less with

bitterness. We may attempt to blind ourselves to the fact that the peak of life has been passed and that the downhill march has begun, and that from that first moment of recognition the descent is progressive and inevitable to the moment of final extinction. But we cannot; and the severest test of human character is at hand, whether we shall accept the situation with equanimity or in sorrow vainly regretting.

Just when the tide begins to turn in any given individual from the high-water mark of maturity down hill cannot be determined with accuracy. The individual variations are great, five to twenty years in apparently normal individuals. It becomes very difficult, therefore, to differentiate a normal first climacteric from a premature or a deferred one. The transition from the stage of growth-equilibrium to that of regression shows no sharp line of demarcation. Age comes at first with a slow and insidious approach, unheralded and unperceived, until all at once the unwelcome guest is established with us. The functions of the various organs and tissues do not begin to diminish uniformly; there is an interlocking of mature function and retrogression, just as there is in the case of incompletely evolved and mature function on the ascending curve of life. Senescence is, therefore, a gradually developing complex or syndrome of organ and tissue involutions. When these become sufficiently advanced as to become clinically apparent, then we say: "Age is upon us." The *aging process* consists, therefore, of a combination of organ- and tissue-involutions, shown histologically by well-defined tissue-lesions and manifested clinically by descending function-curves. While these individual tissue and organ involutions begin at different times, and are to some extent independent of each other, each single line of involution once well initiated, may through the weakening or loss of the given function, initiate or strengthen retrogressive changes in other organs. The various lines of involution are not wholly independent, but in the general economy aid and supplement one another until various

vicious circles and correlations of retrogression are produced. *Senescence* is the gradual development of these lines of retrogression—the resulting complex is *Old Age*. Beginning very gradually and insidiously in the fifth and sixth decades of life for the two sexes respectively, the *Age-Complex* rises rapidly above the clinical horizon in the seventh decade, and in the average individual is usually well-developed in the period from 65 to 70 years. By this time the energy-charge of the organism has fallen so low that senility is usually established in all organs and tissues and manifests itself in a change in all functions. There are, of course, great individual variations in this descent of the energy curve, not only as regards the involution of the organism as a whole but as regards individual tissues. Too-great variations are not common as physiologic phenomena and must be regarded as having a pathological significance.

Functional Changes During Senescence

In Figure 5 the life curves of the four chief vital functions of sensibility, motility, reproduction and nutrition are given for a life of 100 years. These vital functions develop closely together and supplement one another, but show very different values at different periods of their evolution. The curve of nutrition rate drops from birth, being most active in the first and second decades, is maintained thence at a level until about sixty, when the curve descends progressively until the end. The central nervous system functional curve rises continuously from birth until about the seventieth year when it begins a rapid descent. The curve of motility rises during the first two decades of life, reaches a plateau for a decade or more, and falls gradually from about the thirty-fifth year. The curve for the reproductive function is stationary from birth until about the middle of the second decade, rising steeply to reach its apex in the third, and falling to a neutral level in the fifth decade. Each decade of life has, therefore, its corresponding functional activity, and prepares for the vital processes of the succeeding ones.

In Figure 6 the comparative physiology of the stages of growth, maturity and involution are shown for the most important organs and tissues:

Height. Full height is usually not attained until about the 35th-40th year, although the increase after the 20th year is relatively small. After the 65th year there is a gradual decrease in height, more marked after the 75th year, in all about 1-5 cm.

Weight. Very difficult is the determination of average normal weight curves. The individual variations are very great, and the influences of environment, personal habits, sexual activity, reduction in vital energy, etc., produce still greater variations. While many people attain their greatest weight at 25-30, others reach it only in the fourth decade. As the reproductive function declines the majority of both sexes show an increase in adipose tissue, and this increase may persist, or the weight be maintained at this level until the latter part of the seventh decade. How much of the climacteric tendency to obesity is physiologic, how much of it pathologic, due to disproportion between intake and combustion, remains to be determined. In a certain degree the obesity of this period must be regarded as one of the signs of senescence, associated with the decline of the reproductive function (spermatogenesis) and general activity. After the 70th year there is a very definite loss of 2-5 kg., due to the loss of the water-content and other changes in the connective tissues.

Skeleton. Processes of ossification may go on in the body even up to the 60th year, but the normal extent is usually reached by the 30th year. Through the loss of water content the old bones become firmer, and this process continues progressively during the period of involution. After 50 years the long bones and the larger flat ones gradually become osteoporotic, with larger marrow spaces and corresponding increased fragility. They may retain, however, their normal conformation. The spinal column becomes shorter and more sharply curved; the intervertebral disks become contracted and thinner. With

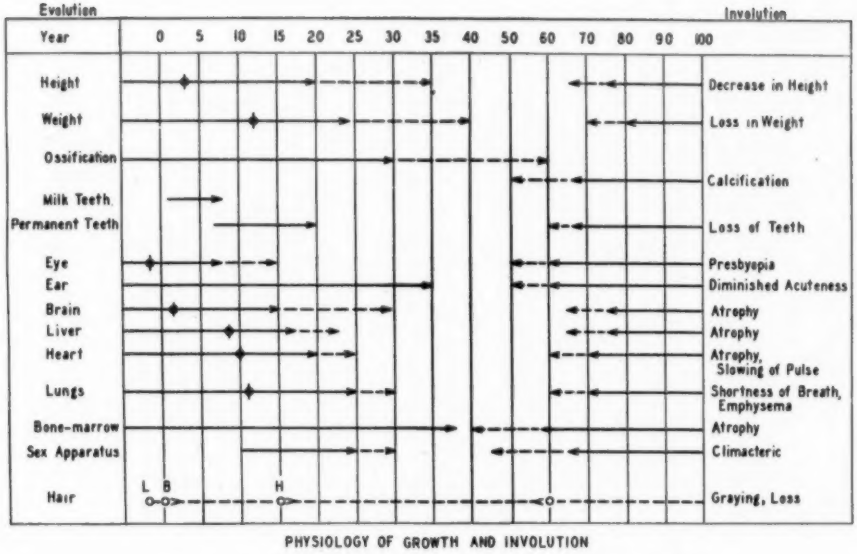


Fig. 6. (Based in a small part upon Stratz. Chiefly author's own material.)

loss of the teeth atrophy of the alveolar processes occurs, and there is developed the characteristic senile facies which cannot wholly be concealed by artificial teeth. In the skull the sutures become indistinct or may wholly disappear.

Calcification. Coincident with the beginnings of osteoporosis deposits of lime-salts begin to appear in sclerotic blood vessels, cartilages and elsewhere. This is always to be regarded as a retrogressive condition, secondary to some previous degenerative change. The demarcation between the purely physiologic involution change and pathological processes of calcification is very difficult of determination, and we possess no criterion but that of degree.

Teeth. The teeth are usually fully developed by the 25th year, in exceptional cases by the 30th, and under physiologic conditions should persist until about the 65th year. Under modern conditions scarcely an individual of 50 years is in full possession of sound teeth, and the majority may be lost by 60 years.

Eyesight. From the time of birth the field of accommodation is progressively narrowed, from 14 diopters in the nursling, to 12 diopters at 15 years, 10 diopters at 20 years, 7 at 30 years, 4 at 40 years, 2 at 50 years, and under 1 at 60 years. These changes constitute perhaps the best index of physiologic age recognizable clinically. This narrowing of the visual function leads gradually to presbyopia between 45-50, increasing much after 50 years. In many individuals the advent of far-sightedness is the first recognizable sign of senescence and the recourse to eye-glasses marks the period. There is a very close relationship between its appearance and the beginning of the decline of the reproductive function.

Hearing. A decided loss in acuteness of hearing begins usually at about 65 years, and may increase progressively to the end of life. In the very old the degree of deafness is usually marked.

Intellectual and Spiritual Life. While there are great individual variations, these functions of the central nervous system usually are preserved in physiologic old age and may increase in value until about the 65th year when some impairment of memory and mental reaction may begin to show; after 70 the retrogression of cerebral function proceeds rapidly, so that in those who reach or pass the 80th year a characteristic picture of "second childhood" develops. Here again we are confronted with the very great difficulty of distinguishing between physiologic involution and pathologic conditions because of the great range of individual variation.

Digestive Function. A lowering of this function begins shortly after the 60th year, and is shown chiefly in a lessened appetite, "heavy" and unpleasant digestion, gas-production and constipation. These evidences of lowered function in the alimentary tract increase progressively to the end of life. An inadequacy of pancreatic function is frequently shown in the so-called "benign glycosuria" of the aged. The bilirubin content of the blood serum is usually increased in old age.

Circulation. The pulse rate falls from 120 at birth to 70-80 at maturity, and after the 60th year to 60 per minute. In the majority of individuals there is usually an increase in tension from the 50th year on to about the 70th when many old people show a decided lowering. More or less marked irregularity is common after the 65th year. Particularly with respect to this function are the boundaries between physiologic involution and pathologic conditions very poorly defined, and the individual variations are very large.

Respiration. The respiratory rate sinks from 28 in the newborn to 18 per minute at maturity and to 16 or lower in the old man. Expiration is prolonged. Shortness of breath, in severe degrees asthmatic in character, constitutes one of the unpleasant symptoms of old age.

Bone-marrow and Lymphoid Tissues. Blood-cell formation is reduced; the senile individual presents a certain degree of secondary anemia. Although immune to a large number of the infectious diseases through which he has passed in the course of his life the senile individual loses resistance to the respiratory infections, the pyogenic cocci and to mould infections of the skin and to thrush. Various forms of *tinea pruritus* are very common in the aged, and erysipelas increases in incidence during this period.

Urinary Function. Disturbances of this function are very common after the 60th year. Polyuria, nycturia, pollakiuria, retention, incontinence, cystic glandular hyperplasia of the prostate leading to stasis, cystitis, calculus, etc., are among the most unpleasant and almost universal symptoms of the senile period. We are even at a greater handicap here in differentiating normal involutions and pathological processes, and the individual equation plays a very large role as to the extent and degree of the urinary disturbances of old age.

Hair. Graying of the hair is regarded as a physiologic involutionary change and usually has appeared by the 60th year. Coincident with this is the appearance of the coarse "senile bristles" in the nose, ears and eyebrows. The body hair becomes more abundant and also coarser. It is still a mooted question whether baldness is a physiologic involution, or an inherited pathologic condition, or a pathologic condition resulting from the habits and conditions of life. Some individuals achieve the extreme limits of age without becoming bald; the majority, however, show varying degrees of baldness after maturity has been passed, the daily loss of hair exceeding the new growth. Changes in the elasticity of the skin usually accompany those of the body and head hair. "Wrinkles," roughness, discoloration and a tendency to hyperkeratosis gradually develop after the 55th year; but here again the individual variations are so great and the influence of the environment so potent that no positive statements can be made as to the time and degree of the skin changes due

to age. The same thing may be said as to the sinking of the female breast as an index of age; it occurs in some women even shortly after puberty. All soft parts of the body undergo a very appreciable shrinking after the age of 70 due to the loss of water content.

Reproductive Function. Inasmuch as this is the chief function of the individual life and from the biological point of view the one logical reason for the ascent and maturity of the animal energy machine, it is but logical to conclude that when the carrier of the immortal germ plasm has arrived at maturity and continued at that stage sufficiently long enough to have secured its survival in his progeny, he, himself, is now in the way of evolution. Biologically useless he now becomes, and he disappears by a gradual fading-away process from the active stage of life. The old saying, expressed less vulgarly than in the original form, that "When the reproductive capacity has ceased, then the man is as good as dead!", is based upon an absolute foundation-fact. All of the evolutionary process of life prepares the animal organism for the performance of this function, and as soon as it has been accomplished the tide of involution begins to turn. If we judge the course of this function by its results in progeny—that is, by the fertility of the human race—we see that its peak is reached in the third decade of life. There are so many other factors determining the production of children during this period, that fertility and reproductive capacity do not necessarily produce parallel curves; and it is much more probable that the peak of the curve of the functional capacity for reproduction falls rather in the latter part of the 4th decade or about the beginning of the 5th. There takes place then a very rapid decline in reproductive capacity for both sexes, earlier and more rapidly in the female, so that by 45-50 she usually loses the function of reproductive power. The same climacteric for the male is usually placed about ten years later, at 55-60. We do not know, however, the approximate time when spermatogenesis in the human male ceases. It has been generally assumed that active spermatogenesis in man persists

usually until about the 63rd year, and in some men until a much later time. There are, of course, in the literature numerous tales of very old men becoming fathers. It it possible that the individual variations as to spermatogenic function are as great as these stories would indicate, but it is also doubtful that many of those tales of senile fatherhood are true. Few male bodies over 55 years of age come to the autopsy table with evidence of active or normal spermatogenesis in their testes. While it is possible that in many of these cases of aspermatogenesis this condition is the result of the disease causing the death of the individual, the same condition is also found in the testes of healthy individuals at the same age dying of accident. The writer is inclined to believe that for the majority of men active sperm-formation ceases in the 6th decade. The absence of sperm in the semen has apparently no relationship to the persistence of sexual desire and potency for sexual intercourse; as these features of the reproductive function may persist, and even increase in intensity long after all sperm-cells have disappeared from the semen. After spermatogenesis has ceased it would appear that the continuation of virility constitutes a certain social function in holding parents together until the children's future is assured. Experience has taught the writer that many men over 50 years of age, priding themselves on the preservation of their virility, but unable to achieve children in marriage with younger women, show on microscopic examination total absence of spermatozoa in the seminal discharges, and without a history of previous venereal disease. This is not a question that has received any adequate investigative study; such is badly needed to throw additional light on the senescent period. From what knowledge we possess we can say reasonably that the peak of life coincides with the peak of the reproductive capacity (spermatogenesis), and the downhill retrogression of senescence runs a fairly close parallel with the decline of the spermatic function. It should be emphasized in this connection that this view of senescence has

nothing in common with the interstitial-cell theory. Coincident with the retrogression of the sperm-cell production go other evidences of a progressive loss of energy. Chronic and progressive fatigue, lack of aggressiveness,

Fig. 7. The Climax of the Play. Man of 63 years, just at the beginning of senescence. (After Stratz.)

disillusionment, mental and spiritual depression and a gradual lowering of all activities mark this decline in varying degrees. If we sum up all of the functional evidences of involution, and group them as to their order of

appearance and importance it is interesting to note that the first signs of age noted by the average male at this period are: Presbyopia, sexual neurasthenia, and chronic fatigue. This triad of symptoms may be taken as marking the advent of senescence. (See Figure 7.)

The Picture of Fully Developed Senility

By the 65th-70th year the processes of involution have usually become so evident that the fully developed picture of Old Age is presented. The main features of this picture may be summed up briefly, as follows: A stooping or bent posture, reduction in height, increased bony prominences, stiffness of joints, loss of stretching power, a shuffling gait, uncertain movements, appearance of general weakness, loss of coördination, tremors, general emaciation, flabby panniculus, dependent breasts, hang-belly, flabby and soft musculature, hernias, prolapse, flabby and shrunken genitalia, frequent hydrocele, loss of teeth and atrophy of alveolar processes, barrel-shaped thorax with widening of the epigastric angle, obliterated interspaces; the skin inelastic, wrinkled, rough, showing patchy pigmentations and hyperkeratoses; there is graying and loss of the head hair, while senile bristles occur in the eyebrows, nostrils and ears; the body hair is usually increased, coarser, and gray or white; vision is dim and uncertain, the conjunctiva are reddened and watery, the cornea dull, the limbus opaque; hearing is dulled; the voice husky or cracked, speech slowed and uncertain, the mouth is dry the tongue coated and fissured, and there is a slight husky cough; respiration is slowed, and shallow, with prolonged expiration; the peripheral arteries are tortuous and hard; the pulse slow, irregular and frequently increased tension; there is a tendency to varicose veins and hemorrhoids; the metabolic rate is lowered; the secretions of all organs diminished; digestion is slow and difficult; excessive gas production, eructations and constipation occur in varying degrees; benign glycosuria is not uncommon; bladder control is lost to some extent, retention, pollakiuria, nycturia,

and incontinence are frequent symptoms; the bodily temperature is frequently subnormal, and the senile individual complains of cold and is easily chilled; the sensory nerve-endings, tactile, sexual, etc., are dulled; and finally the involution processes in the central nervous system show themselves in loss of memory, slowness of mental

Fig. 8.

Fig. 9.

Fig. 8. Well developed senility in woman of 70 years (after Stratz).

Fig. 9. Well developed senility in man of 76 years (after Stratz).

reactions, asphasias, psychical fatigue, and weakness, irritability, changes in personal habits, daytime sleeping and nocturnal insomnia, "second childhood" and dementia. This picture of fully developed senility is well illustrated in Figures 8 and 9, the old man of 76 and the woman of 70 years of age. In Figure 10 the contrast between an old father of 80 years and his son of 37 years emphasizes the differences existing between the period of full maturity and that of advanced senility. The weary, worn-out machine of the old man contrasted with the insolent aggressiveness of the son in the height of his maturity tells the story of the meaning of involution and old age more effectively than any detailed scientific description can do. Only in Solomon's figurative description of old age in the last chapter of Ecclesiastes is there to be found in any of the world's literature an adequate word-picture of the closing days of human life: "In the day when the keepers of the house shall tremble, and the strong men shall bow themselves, and the grinders cease because they are few, and those that look out of the windows be darkened,

And the doors shall be shut in the streets, when the sound of the grinding is low, and he shall rise up at the voice of the bird, and all of the daughters of music shall be brought low;

Also when they shall be afraid of that which is high, and fears shall be in the way, and the almond tree shall flourish, and the grasshopper shall be a burden, and desire shall fail: because man goeth to his long home, and the mourners go about the streets."

Termination of the Involution Process in Intrinsic Death

When the involution of the organism has reached such a degree of functional lowering that any one of the vital functions cannot carry on, then biologic death takes place, and the career of the individual human organism is closed. As we said early in this paper such a biologic or normal death is rarely achieved by man—he usually succumbs to

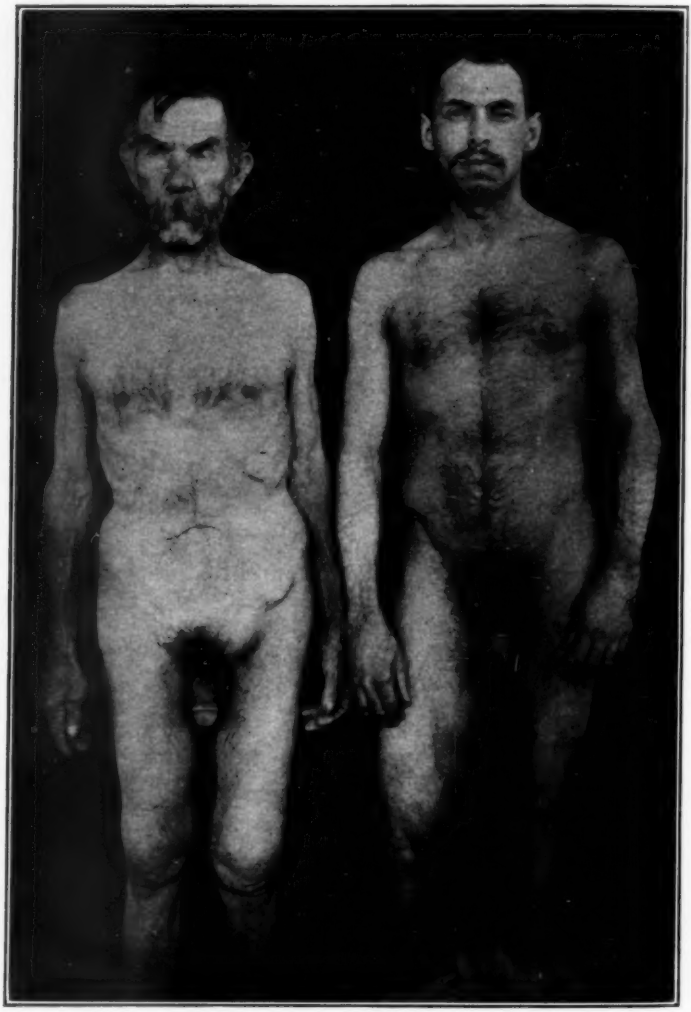


Fig. 10. Father of 80 years of age and son of 37 years. Contrast between fully-developed senility and the period of the height of maturity. Author's observation.

influences of the environment or dies prematurely because of inherent pathological defects in his organism. Assuming, however, a case in which an individual achieves a natural biologic death two leading questions arise: When will such a biologic death take place and how is it brought about? What is the natural limit of human life? By many biologists it is theoretically placed at about 100 years, but many old people reach natural death 10-20 years earlier, and a small number exceed this limit by a number of years. The individual variations are so great, and the differentiation of a natural intrinsic death from a pathologic extrinsic one so difficult that we possess no large amount of pathologic knowledge in regard to this point. Nevertheless, deaths do occur in the aged that we must ascribe to the primary lesions of senility alone, as all evidence of extrinsic disease is absent. It is a well-known fact that sudden death in old people is not uncommon during the enforced rest following a cataract operation. When allowed to get up, the atrophic heart which has lost tone through the period of inactivity cannot recover its oxygenation power, an acute inadequacy of the myocardium results with dilatation and sudden death. The only lesions of any significance found in some of these cases are those of old age: More or less coronary sclerosis, atrophy and fatty degenerative infiltration of the heart muscle. The same conditions precisely will be found in the hearts of old people who have died quietly in bed. It is fair, I think, to ascribe these deaths to senility, although such a term is not an accepted designation as a cause of death. In my experience of 38 years I have seen not more than 25 autopsies in which I felt that the pathologic diagnosis of pure intrinsic senile death could be justified, and all of these were due to myocardial atrophy and inadequacy.

Personally, I would regard this tissue-condition as the most probable natural terminal lesion of life. The purely senile death should be, therefore, a *cardiac death*. The vital function of the circulation is more likely to cease before that of respiration or of the nervous system. The cause of intrinsic biologic death is inherited in the cell; few

individuals will attain it because of the varying environment and the individual varying intrinsic reactions to the environment. The average equation resulting between these two factors brings about a life limit shorter by 15-25 years than the theoretic biologic limit of 100 years. This fact has tended to fix in the popular mind the Psalmist's *three score and ten* as the ideal term of human life. But only a small per cent. of human beings born alive can hope to attain even this. Out of every one hundred human beings born alive only about 4-8 per cent. pass the 60th year. Twenty per cent. die in the first year of life; by the age of 20 years 40 per cent. have died; and only 2-4 per cent. attain the age of 80. (See Figure 11.) The lowered resistance of the body during the period of senescence, and the pathologic conditions secondary to and dependent upon the tissue-lesions of involution are the causes respon-

Of every 100 human beings born	According to Hufeland (1800)	According to Silbergleit (1900)
Living to the 10th year	50	65
" " " 20 "	30	60
" " " 30 "	20	58
" " " 40 "	14	55
" " " 50 "	9	40
" " " 60 "	6	12
" " " 70 "	4	8
" " " 80 "	2	4

Fig. 11. Expectancy of the duration of life in different decades in 1800 and 1900, according to Hufeland and Silbergleit.

sible for the rapid increase of deaths after the peak of maturity has passed. Modern sanitary and hygienic science has, however, increased markedly the number of senescent survivors. According to Hufeland, in 1800, only 9 individuals out of 100 reached the age of 50; according to Silbergleit, in 1900, there were 40 out of every hundred

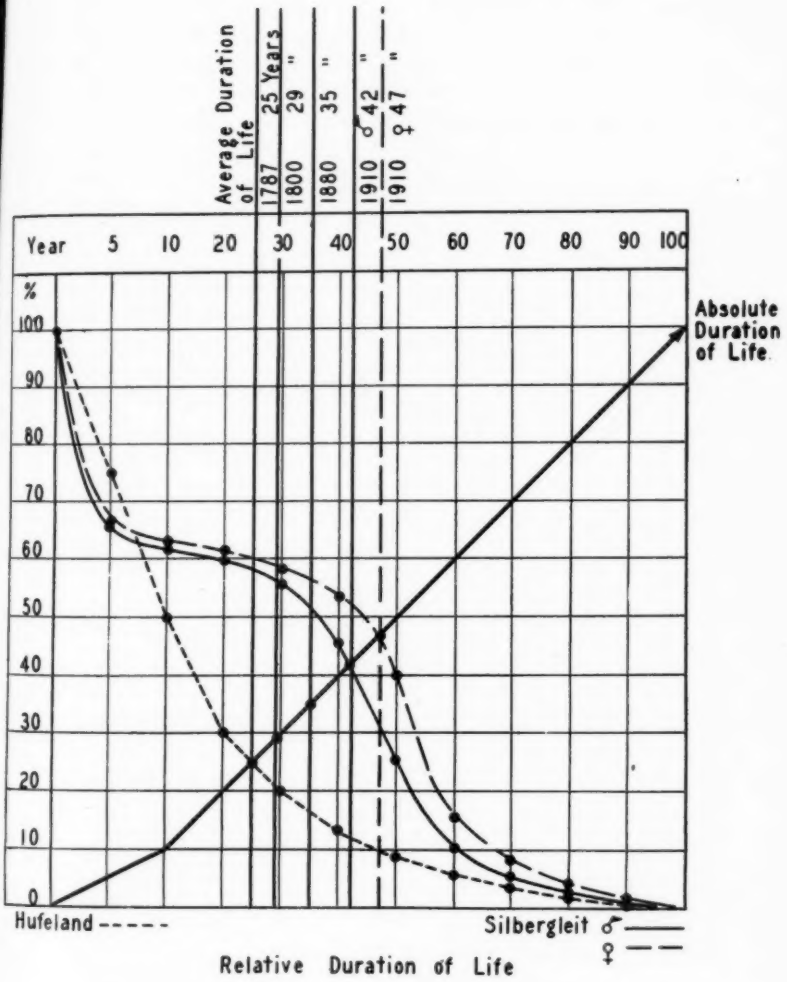


Fig. 12. Relative duration of life, according to Silbergleit.

Senile Survivors, Both Sexes in America According to Census Reports of 1880, 1890, 1900, 1910, and 1920.
(Census Report, 1920, Vol. II page 154.)

	1880	1890	1900	1910	1920
80–84	146,362	203,851	251,512	321,754	402,779
85–89	49,835	75,240	88,600	122,818	156,539
90–94	16,100	23,645	23,992	33,473	39,980
95–99	4,763	5,648	6,266	7,391	9,579
100 and over	4,016	3,981	3,504	3,555	4,267

Fig. 13. Based on U. S. Census Reports.

Total Survivors at Ages 80–89 and 90–100 According to Census Reports.

Age Decades	1880	1890	1900	1910	1920
80–89	196,197	279,091	340,119	444,572	559,318
90–100+	24,879	33,274	33,762	44,419	53,826
Ratio of Survivors at Ages 80–89 and 90–100+ to Total Population for Same Periods					
80–89	.0039	.0044	.0045	.0048	.0053
90–100+	.0005–	.0005+	.0004+	.0005+	.0005+

Fig. 14. Ratio of senile survivors in decade 90-100 remained unchanged from 1880-1920, showing that modern life has not increased the biologic span of life.

who attained this age (figures for the population of North Germany. (See Figure 12.) This represents a conquest of modern life over the environment; and means a greater expectancy of life at birth, and an average longer duration of life. The intrinsic inherited biologic duration of life, however, remains the same, and cannot be affected by these changed conditions, except possibly in a long evolutionary period. In Figure 13, the senile survivors for the half decades from 80 to 100 years, are given for the last five United States Census Reports, and in Figure 14 the relative proportion to the total population is given for the ages 80-89 and 90-100 for the same periods. From this chart it will be seen that while the 1920 census shows an increase of senile survivors in the 80-89 decade over that of 1880, there is practically no increase in the ratio of survivors in the 90-100 decade during the same period of time. This is in harmony with our view. Improved modern life increases the number of senescent survivors up to the 80-89 decade, but does not increase the number of senile survivors after the age of 90. Modern conditions, as expected, have not extended the individual biologic life limit, and cannot do so.

Primary Involution Tissue Changes

The tissue changes of the involutionary process are identically the same for the period of senescence as for the involution processes of temporary structures during intrauterine life and in the extrauterine period of evolution. The changes in the senescent placenta may be taken as an example of their nature. There is a progressive thickening and contraction of the chorionic stroma; from a loose semimyxomatous tissue it becomes increasingly fibroid, its stroma cells fewer in number, and the intercellular substance more hyaline in character; the blood-vessels show thickened and more hyaline walls, and the lumina gradually become narrowed. The cell-layer of Langhans of the chorionic ectoderm disappears by the middle or end of the third month of pregnancy; the syncytium undergoes a

gradual loss in proliferative power, syncytial buds become fewer, and on the older and more fibroid portions of the chorion localized necrosis of the syncytium takes place, preceded by marked nuclear pyknosis and vacuolation. Intervillous thrombi are formed on the dead and degenerating syncytium, deposits of lime salts take place when the vascular sclerosis and obliteration reaches a certain stage. A slow anemic infarction of a cotyledon or portion of such may take place—the physiologic anemic infarct of the placenta. Without going further into detail of the changes in the various organ and tissue involutions, we may say that essentially they present identical tissue lesions, and that these are the same in the involutionary processes of old age. These involutionary tissue-changes are:—

1. Loss of power of division. Fewer mitoses. Fewer regenerative proliferations. Numerical atrophy.

2. Quantitative atrophy. Parenchymatous cells fewer in number and smaller in size. Reduction in cytoplasm and in nucleus. Condensation of chromatin, pyknosis, eventually vacuolation and karyolysis. Frequent appearances of lipoid droplets in cell cytoplasm; in many cells lipoid pigments appear.

3. Shrinking and condensation of intercellular substance, most frequently a hyaline fibrosis; loss of water, changes in colloid state; in the panniculi the fat cells are replaced by a mucin-containing stroma resembling that seen in myxedema.

4. Vascular changes. These are characteristic of the involutionary process at all periods, and must be inherent within the vessels themselves, inasmuch as wear-and-tear forces can hardly explain the sclerotic changes occurring in the ductus arteriosus, umbilical vessels, involuting thymus, and later in the ovary after the first follicle has ripened and discharged. In all periods of involution the vascular changes are histologically identical with those occurring during senescence. Without going into a detailed description of the well-known features of the arte-

riosclerosis of age, the essential features of which are an atherofibrosis of the vessel wall, with or without proliferative changes, ultimate loss of elastic tissue and muscle cells, occlusive or with dilatation of lumen, and incidental lime-salt deposits. Aside from the processes of thrombosis, embolism, aneurismal dilatation, rupture, etc., which may be secondary to the vascular changes, the resulting disturbances of circulation in the parts supplied by such sclerotic vessels are extremely important in the secondary pathology of senescence. The main features of the gross pathology of the viscera of the senescent body are: 1 Atrophy. Reduction in size except in the case of the emphysematous lung and the hyperplastic prostate; 2, Increase in consistency, due to the relative increase in stroma; 3, Changes in color, browner or grayer; 4, Increased translucency; 5, Serous atrophy of adipose tissue. Throughout the entire body, there is an increased toughness of the connective tissue membranes and fascias. Special senile features of the autopsy are the increased adherence of the dura mater, the erosion of the inner table of the skull, the Pacchionian erosions and perforations, the thickened and more opaque meninges, the more sharply pointed cerebral convolutions, the thickened and frequently cystic chorioid plexus, the discoloration and calcification of the cartilages, osteoporosis of bones, pulmonary emphysema, low diaphragm, barrel thorax, droplet heart, ptoses of gastro-intestinal organs, the generalized atrophy and passive congestion. The atrophy of the viscera shows most markedly in the spleen, liver, testes, heart, lungs and pancreas, differing in this order from the atrophy of starvation. The adrenals always show an excessive degree of lipoidosis. The atrophic testes are browner in color from the lipoid pigment increase in the interstitial cells.

Before leaving the subject of the primary pathology of age, the changes in the testis deserve additional attention. So much has been said about the potential immortality of the germ plasma that many people assume that its existence in the sex-glands, at least in the testis, continues until the end of the life of the individual. We have made

it clear above that the germinal epithelium of the spermatic tubules undergoes retrogression very early in senescence, and that its atrophy is practically coincident with the advent of senescence. In the very old individual the testis may be fibroid, or nearly so, the tubules being represented by the hyaline basement membranes of the old tubules. If any tubules still persist the epithelium is reduced to a single layer of low vacuolated cells, or the epithelium may be gone entirely. As this atrophy of the spermatogenic tissues develops in the early part of senescence the so-called interstitial cells (puberty gland) become larger and more prominent, brownish in color and filled with lipoid droplets. In many cases they form such striking masses of cells scattered among the atrophic tubules that an increased number seems possible. This prominence of these cells may persist, and apparently does so, until the end of life. Such changes are wholly in contradiction to any theory of a rejuvenating internal secretion ascribed to these cells. On the other hand these cell changes support the view that their function is a metabolic, nutritional one, concerned in the process of spermatogenesis, and when this process comes to an end, these cells become over-burdened with a lipoid pigment similar to the disuse lipoid pigmentations occurring in other atrophic tissues.

Secondary Pathology of Senility

The secondary pathologic conditions that are made possible and favored by the primary involution process are many and of great clinical importance, because it is usually through some one of these that the senile individual is kept from achieving a biologic death. They include nearly all of the causes of deaths occurring at the period of life. They fall into several well-defined groups:—

1. *Secondary to the Vascular Changes.* Thrombosis, embolism, infarction, atrophy, apoplexy, cerebral softening, paralysis, psychical degeneration, etc., due to cerebral arteriosclerosis; coronary sclerosis, thrombosis, myocardial infarction, angina pectoris, cardiac insufficiency, etc.:

renal arteriosclerosis, contracted kidney, nephrosis, chronic nephritis, etc.; peripheral sclerosis leading to gangrene. Sclerosis of aorta, aortalgia, angina.

2. *Secondary to the General Atrophy.* Reduced functions of all organs including endocrinal. General lowering of resistance. Increased susceptibility to respiratory infections, bronchitis, broncho-pneumonia, erysipelas, etc. Functional inadequacies, glycosuria, etc.

3. *Stasis Conditions.* Infections of urinary and genital tract. Cystitis, prostatitis, pyelitis. Infection of biliary and pancreatic tracts. Stasis catarrhs of alimentary tract, constipation, etc. Formation of calculi in any of the body passages (biliary, urinary, salivary, etc.).

The most important of these pathologic conditions of old age secondary to the primary lesions of old age are shown in Figure 15.

Concentration of Disease in Certain Age Periods

Another striking relationship between disease and the time of life is shown in Figure 16 which represents the predominance of certain diseases in different age-periods; rachitis in the first five years, rheumatic fever in childhood, tuberculosis in the late childhood and adolescent period, venereal diseases at puberty and early adult life with the carrying on of syphilis through middle life producing many varied pathologic conditions then, neoplasms other than carcinoma in the early part of adult life, carcinoma in the senescent period, likewise in this period various metabolic conditions associated with the progressive loss of energy, cardiovascular diseases in senility, and two periods for diseases of the nervous system, that of early sexual life and that of early senescence. Numerous factors concerned with environment, stage of development, social, emotional, etc., are concerned in this concentration of diseases in certain periods of life, and cannot be discussed here. The association of carcinoma with the senescent period is so striking that cancer is regarded by many

SECONDARY PATHOLOGICAL CONDITIONS ASSOCIATED WITH THE AGING PROCESS

Central Nervous System	Cerebral arteriosclerosis. Thrombosis. Embolism. Infarction. Hemorrhage. Atrophy. Sclerosis. Loss of memory. Loss of self-control. Perversion. Senile dementia. Senile psychoses. Vertigo. Senile epilepsy. Senile chorea. Apoplexy. Hemiplegia. Paraplegia. Aphasias. Apraxia. Brown-Sequard's Syndrome. Presbyophrenia. Hysteria. Autosuggestion. Insomnia. Melancholia. Exaggerated ego. Hallucinations.
Eye	Loss of Accommodation Power. Arcus Senilis. Senile Cataract.
Ear	Atrophy of Nerve. Sclerosis. Progressive Deafness.
Thyroid	Atrophy. Reduced metabolism. Skin changes.
Heart	Myocardial Degeneration. Cardiac Inadequacy. Coronary Thrombosis. Infarction. Cardiac Thrombosis. Angina. Numerous Functional Disturbances.
Aorta	Aortalgia. Angina. High or Low Pressure. Thrombosis. Embolism.
Lungs	Chronic Bronchitis. Bronchopneumonia.
Arteries	Thrombosis. Embolism. Infarction. Gangrene. Atrophy. Diminished Blood Supply.
Kidneys	Arteriosclerotic Atrophy. Pyelonephritis. Stasis-Kidney. Pollakiuria. Nycturia.
Bladder	Stasis. Cystitis. Calculus.
Prostate	Cystic Glandular Hyperplasia. Stasis. Secondary Infection.
Liver	Atrophy. Reduced Function.
Gall-bladder	Stasis. Calculi.
Pancreas	Atrophy. Lowered Function.
Gastrointestinal Tract	Atrophic Catarrh. Stasis. Disturbances of Digestion.
Lymphoid Structures and Bone Marrow	Lowered Resistance, Anemia.
Bones	Osteoporosis. Fragility. Fatty Embolism. Deficient Healing.

Fig. 15. The chief secondary pathologic conditions associated with the aging process.

as a disease of senescence. It, however, does not occur in all old people, as does arteriosclerosis; it is not a primary involution process, and not a biologic retrogression; it, therefore, is not an essential feature of old age, but is

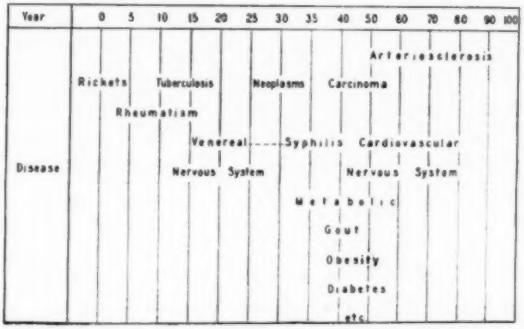


Fig. 16. Concentration of pathologic conditions in various age-periods.

dependent upon an inherited pathologic anomaly of constitution, that like gout and other metabolic anomalies asserts its development coincidentally with senescence.

Theories of Senescence

Curiously enough many medical men of the last century, lacking the wisdom of David and Solomon in recognizing that the life of a man has a definite normal limit, have regarded the aging process as a progressive disease; according to Brown-Sequard caused by the sclerotic changes in the vessels, according to Metschnikoff by intestinal putrefaction, according to Victor Horsley due to degeneration of the thyroid gland, while Lorand and numerous followers of his believe that it is caused by the degeneration of all the ductless glands, particularly the thyroid, adrenals and gonads. The modern scientifically-trained biologist, however, cannot look upon senescence and old age as disease processes but regards them as a physiologic entity, the result of involution processes inherent in the organism. The exact mechanism of this involution is, of course, the

great problem, and concerning this there are various opinions. The most important of these views may be briefly stated as follows:—

Age is due to a loss of growth-energy, so that the cell loss exceeds the regenerative powers, and numerical and quantitative atrophies ensue. This loss of cell growth is due, according to different workers to:—

1, Increase of specific growth-inhibiting factors.

2, Decrease of specific growth-stimulating factors.

3, A combination of the two preceding causes, both acting conjointly.

As to the source of these hypothetical specific substances there are wide variations of opinion, as follows:—

a, Physico-chemical changes in the blood-serum (senescent serum).

b, Changes in the physico-chemical equilibrium of the organism (changes in the colloid states, in the water-content, in the pH, acidosis, alkalosis, etc.).

c, Accumulation of toxic waste products of metabolism (chronic fatigue, auto-intoxication).

d, Endocrinal disturbances, either a hypoactivity, hyperactivity, or dysfunctional production of abnormal toxic growth-inhibiting substances, disharmony in the pluriglandular endocrinal complex, loss of energy power due to loss of specific rejuvenating substances produced by the interstitial cells of testis and ovary.

e, Disturbances of the intrinsic conditions of the metazoan organism associated with differentiation of cell function. Loss of differentiation power, reversal of growth processes due to nutritional factors, changes in cell environment, etc.

A detailed critical review of these theories is not possible within the limits of this paper. In general they are

all built upon insecure foundations, hypothetical substances and hypothetical changes, that may be due to the processes of senescence and not its cause. Not a single one of all the theories of senescence so far offered has a leg to stand upon; for the greater part they are pure hypotheses constructed about some single fact, such as the increased growth-inhibiting power of the senescent's blood serum or changes in the pH, or some other similar uncorrelated observation. Much has been recently made of the cultivation outside of the animal body of tissue and organ cells. A potential immortality has been claimed for the somatic cell as well as for the germ cell—because of this, biologic hints of the possible immortality of the soma are thrown out by over-enthusiastic biologists and journalists. It is a great temptation to enlarge upon this subject, but it is perhaps futile to pursue arguments aggressively for which there is so little, or no, biologic foundation. The cultivation of tissue cells *in vitro* has precisely the same broad biologic significance as the cultivation of neoplasm cells. It is a pathologic situation, and not a biologic one. Further, all of the theories of senescence mentioned above are fundamentally wrong in that they look upon the phenomena of involution shown in senescence as in any way different from that of the involution of the temporary organs and tissues shown in early embryonic, throughout the period of fetal life, the early periods of extrauterine development, and in fact throughout the whole period of existence of the organism. There is no difference in *kind* in any of these localized involutions, they take place to get rid of *parts* that have fulfilled their use; the *very same factors* come into play when the organism has completed its function and must be removed from the scene—it is only a question of *time* and *degree* of involution. Senescence cannot be considered as a physiologic entity belonging to the latter period of the metazoan organism. Involution and Evolution are inseparable processes and go hand in hand from the time of the union of sperm cell and ovum. The discarding of the polar bodies,

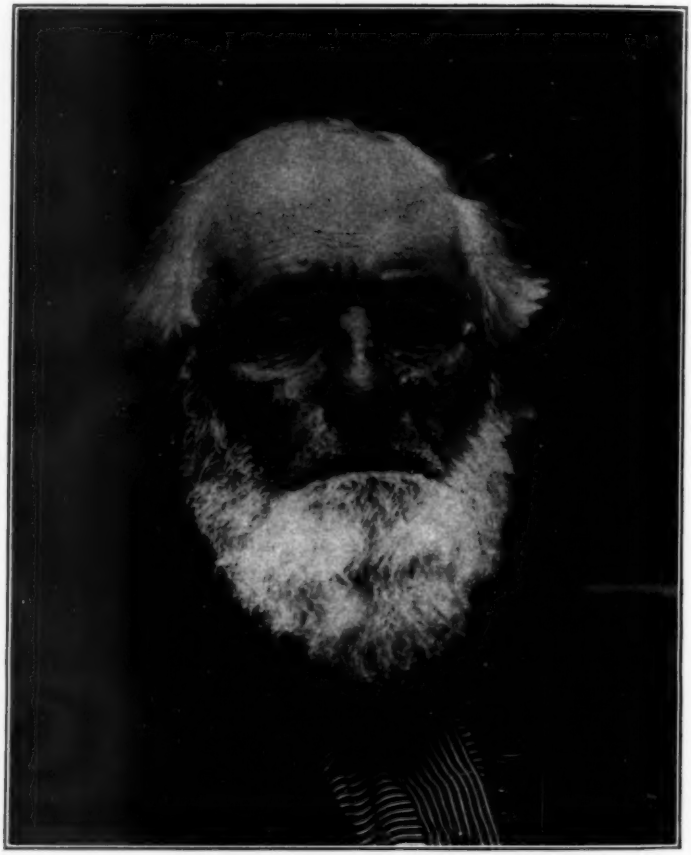


Fig. 17. The End of the Play. (Man of 98 years of age, in complete second childhood, with multiple malignant senile hyperkeratoses over face and body. Author's observation.)

the loss of the tail of the sperm cell, the very act of fertilization, are prophetic of future involutionary processes in the life of the organism. The senescent process is potent, therefore, from the very beginning, and grows in volume and extent in proportion to just one thing—*the fulfillment of function.* None of the theories of senescence detailed above is applicable to these earlier and localized *senescences;* if they cannot be fitted to the explanation of these, they cannot be applied to the explanation of the *major senescence.* It is evident then that *involution* is a biologic entity equally important with *evolution* in the broad scheme of the immortal procession of life. Its processes are as *physiologic* as those of growth. It is, therefore, inherent in the cell itself, an *intrinsic, inherent, inherited* quality of the germ plasm, and no slur or stigma of *pathologic* should be cast upon this process. What its exact chemico-physical mechanism is will be known only when we know the nature of the *energy-charge* and the *energy-release* of the cell. We may say that *senescence is due primarily to the gradually weakening energy-charge set in action by the moment of fertilization. The immortality of the germ plasm is dependent upon the renewal of this energy-charge from generation to generation.*

Conclusion

What philosophy then may we draw from this! Is old age inevitable? Yes, escape from it is possible only for those who meet a premature pathologic death. For those who live to their biologic limit age cannot be escaped. *Nor can it be deferred. Nor is rejuvenescence possible.* The deferring of old age, the rejuvenating of the senescent individual is but idle and foolish talk, and we have had much of this in the last decade. What modern medicine has accomplished along the lines of hygiene and the prevention of disease has been only to increase the number of human individuals, both the fit and the unfit—unfortunately too many of the latter kind—who come to maturity and to the period of senescence. More individuals will achieve their biologic life limit; and this means what—ulti-

mately a much greater increase in the number of senile, more or less useless, human beings in the age decades of the eighties and the nineties. There will be some increase in the number who will reach the age of one hundred years or even pass it, due to their own family inheritance, but this number will not be greatly increased in the present period of evolution. But what advantage is gained by increasing the number of human dependents in the period of second childhood! Does this thought never occur to the enthusiastic propagandists for the extension of life! I have never seen it mentioned in the literature of such propaganda. There may be individuals who wish to live to the very limit of their biologic allotment, to pass the last decade or two of their descent to the grave in uselessness, non-productive existence, dependency, in personal discomfort, and a burden to others—I personally am not of that sort. Rather the limit set by the Psalmist—"The days of our years are three-score years and ten; and if by reason of strength they be four-score years, yet is their strength, labor and sorrow; for it is soon cut off, and we fly away." (Psalm 90, tenth verse.) The compensations of the seventh and eighth decades are many because of the longer preservation of the spiritual and mental function over that of the other functions. In a life well-ordered and well-spent, of varied physical and mental activities, the break in cerebral function comes in the average case somewhat around the 70th year, and the rapid down-hill descent is usually not apparent until after the seventy-fifth. To this, of course, there are wide individual variations. But with mental powers still preserved this period from sixty-five to seventy-five may be one of satisfaction, even of productiveness. There is an old folk-word, "The first joys of life are those of the belly, the last ones those of the mind, but the fool knows none but those of the belly." Happy then is the senescent who can approach his inevitable end with normal cerebral rate of involution, still capable of intellectual pleasures, and the mature contemplation thereof, and meet a speedy release before the unhappy days of second childhood are upon him.

THIRTY-FIRST ANNUAL MEETING OF THE MEDICAL LIBRARY ASSOCIATION [1]

PRESIDENT'S ADDRESS

ARCHIBALD MALLOCH, M.D., M.R.C.P. (Lond.),

Librarian of The New York Academy of Medicine

In the first place I wish to thank you heartily for electing me your President. It has been a great pleasure to have been quite closely in touch with the work of the Association for a year, although I have not taken a large part in it. You will soon hear from the various reports that we have had a successful year, but we must push on and help to make our own libraries and those of others as useful and as stimulating as possible to those whom we serve.

It is disappointing that we were not able to go to Montreal to see the Bibliotheca Osleriana and to have our Honorary President, Dr. Shepherd, the lifelong friend of William Osler, at our meetings. The library is ready for packing at Oxford now and practically all of the catalogue raisonné is set up in page proof. It will not be long before we shall pay our postponed visit to Montreal, where we are assured of a warm welcome. Our loss caused by the delay will mean gain to the world of medical bibliography, biography, and history through the careful and scholarly work of Dr. W. W. Francis, Mr. R. H. Hill, and Mr. R. R. Trotman, the last two of the Bodleian Library staff. We have just had the sad news of Lady Osler's death. She had hoped, I know, to see all her husband's wishes fully carried out and to see her son's books which are in the Tudor and Stuart Club at Johns Hopkins University.

The items on the programme arranged for this meeting by the Committee under the able chairmanship of Miss Trask should, and we hope will, provoke interesting and beneficial discussions. We trust that there will be ample time for members to talk over their problems with one

[1] The New York Academy of Medicine, 5-7 September, 1928.

another for, I suppose, meetings of librarians are very like those of doctors, one of their chief values being, it seems to me, the opportunity they afford of meeting confrères who are faced with the same or similar difficulties. We of the staff of this Library shall be glad to answer any questions about the methods which we have thought best to follow here where we have a large body of readers among medical men and among the general public.

We thought it a good plan to continue the Harvey Exhibition which was opened early in May especially, as he is to be the subject of the evening address by Dr. Packard. Also, we should like to emphasize the educational value of historical or bibliographical exhibitions, those showing the growth of knowledge of certain diseases in their various aspects, their etiology, distribution, diagnosis or treatment, or exhibitions illustrating the development of measures instituted for the health of the public. Not one of our libraries should feel itself unable to arrange such exhibitions. You may think that your show cases do not receive due appreciation; but take courage in the thought that if even all your best efforts have been the means of turning but one student or one young doctor towards books and towards the history of his subject you have had your reward. A good plan, it seems to me, would be for us all to hold exhibitions illustrating the lives of our local medical heroes showing their portraits and medical notebooks, their old class tickets and diplomas, and the books, medical or non-medical, which they wrote or which they owned. For instance, there is in the museum at Hamilton, Ontario, the old pine door from the house of Dr. Case with three hollows at different levels worn by the knuckles of several generations. What could reveal better than this door the position the trusted doctor held in his community? As another example of local exhibitions we could not improve upon what has been done at the Library of the Medical Chirurgical Faculty of Maryland.

To one who has given up his vocation to take up his avocation as his profession, to one who was, so to speak,

outside libraries looking in but is now inside looking out, one aspect of our work seems to call for emphasis. That is, how are we to bring more undergraduates and doctors into our libraries and make them more serious students? Some of you may reply that they come in large numbers already and I am glad if that has been your experience, but I am inclined to think that it is our duty to try and induce more to take advantage of the books and medical magazines which are provided for them.

The medical man should use books as his tools but obviously he should not be a slave to them. It has been quoted again and again, but I cannot think the matter could be better put in a nutshell than by a saying of William Osler, who, by the way, was such a source of strength to our Association. Turn again to his address, "Books and Men" (*Boston M. & S. J.*, cxliv, 1901, 60-61) in *Aequanimitus and Other Addresses.* I must repeat the passage now: "To study the phenomena of disease without books is to sail an uncharted sea, while to study books without patients is never to go to sea at all." Have this ever in your mind and on your lips in carrying out your campaign.

There is an idea current amongst a considerable number of doctors that one who reads a great deal cannot be a practical man! It is probable they have in mind one particular man who never "went to sea at all" in whose make-up there was something which prevented him from ever being successful in the practice of medicine. Our greatest medical men have known the value of books and of libraries when the volumes on their own shelves were not sufficient for their needs. In reading about William Harvey and in perusing his notes for his anatomical lectures and his other writings I have been struck with the large number of authors, ancient and contemporary, quoted by him whose ideas he had made part and parcel of his own. It is true that he was first and foremost a great discoverer in physiology, but he was also a field biologist and a practising physician and obstetrician. We have the word of one of his contemporaries, Dr. Percival

Willoughby, telling us how much he owed to Harvey's "directions and methods" and truly he has been rightly called the "father of modern midwifery." Surely, then, Harvey was a practical man. Our Honorary President, Dr. F. J. Shepherd, is an eminently practical anatomist, surgeon, and dermatologist, but he is also a great lover of books and paintings.

For some more than for others there is the danger of taking the written word for the whole, when it is only a part, neglecting what can be learnt from observation and experience of everyday practice. Some years ago in reading *The New Republic* I made note of a passage which is to the point: ". . . books are only the telescopes through which we see distant facts: and we no more become *bookish* by such use than you become *optical* when you look through your telescope." All medical men need all the aid they can find to fit together the pieces of "the great jig-saw puzzle of knowledge" (Sir Francis Darwin in *Rustic Sounds and Other Studies*). Doubtless all of you can point to leading doctors in your community who are recognized for their ability and keenness at the bedside and at the same time are your most consistent readers of medical works and of the periodical literature.

How, then, are we to obtain more readers? And, in the first place, let us not forget that the task we have set ourselves is not a light one. It is probably true that the real student is born not made, that is, he is what he is rather by nature than by nurture. Can we in any way assist at a rebirth? The genuine student has, to a marked degree, the virtue of curiosity. You may remember that the amateurs of science in Italy, England, and elsewhere in the seventeenth century were called the "curiosi" as well as the "virtuosi." The former is an especially good term and would that it could be aptly applied to all medical students.

Should the student come from a home where recourse to books for information is an everyday occurrence or

where a love of good literature has been fostered and encouraged from his earliest days the teacher has only to direct and guide his pupil along new paths for the method is known already. We do not meet the student at the beginning of his medical course and the teacher is the logical person to send him to the library where once in our hands we can help him in so many ways. In many medical schools, however,—I am glad to hear their number is decreasing—the teaching staff do not take their medical library seriously enough simply because they do not know its worth, or they take it as a matter of course for they do not frequent it often enough themselves. I knew a medical student who throughout his undergraduate years was asked only once or twice by his teachers to verify a point in the library. What golden opportunities were thus lost! It is impossible to reform such hardened sinners as these teachers.

How, then, are we to set about our task? At some medical schools, notably McGill, the librarian shows groups of students, I think in their more senior years, how to look up things in the library, tells them what the catalogue is, and instructs them how to use the *Catalogue of the Surgeon General's Library* and the *Index Medicus*. This is a good plan but individual instruction is far better if the teacher has sent him with a definite question or preferably if the student comes to the library with an inquiry of his own.

If we cannot catch the student himself or are very unlikely to catch many, let us lay hold of the young instructors in medicine, surgery, and the various other branches of medicine, men who are at the bread-and-butter stage of practice who are themselves in the throes of preparing a paper for a medical society. Try to induce these men—and almost all of them will see the wisdom of your suggestion—to send their students to your library. I am convinced we can do much in this way. Tell these young teachers that you will welcome their pupils and show them the facilities of your library you will be able to provide.

It might be a good plan gently to remind the teachers by writing to them or by placing a notice on the notice board: "Do not forget to send your pupils to the library with definite questions; we are willing and able to help them. They cannot come too early in their course."

The teacher who directs his students to the library does wonders for them. William Osler was perhaps the chief exponent of this method and these excursions amongst books were of incalculable value to the young man who later on had to prepare a paper himself. With many of his students at Baltimore and Oxford an almost daily habit, lasting throughout the years, was thus inculcated. Read Sir William Osler's paper, "The Medical Clinic: a Retrospect and a Forecast" in the *British Medical Journal,* 1914, i, 10-16, and commend to your young instructors the questions asked of the students in "Table II" of the article. I know, too, from personal experience in teaching, how interested the students were when I attempted to follow this one of the Osler methods. I can remember asking students to look up and report to us at the next meeting of the small group on "lanugo," "Argyll-Robertson and his pupil," "Luska," "Harrison and his groove," "the significance of telangiectases," "the discovery of percussion," "Laennec," "pulsation in veins," "hypochondriac," "myoidema," "Babinski," and many other things. May I say with pride to ourselves as librarians that each student returned with an excellent answer for he had been properly guided in the library?

I shall not tell you how to instruct the student when he comes into your hands for you probably know more about the *Catalogue of the Surgeon General's Library,* the *Index Medicus,* and general textbooks than I. May I, however, give two or three parting words of advice? Do not encourage the student in his idea, which is so prevalent, that only the latest editions or the latest books are of use. There are important things, for instance, to be found in Klebs' *Pathology* which are not to be found elsewhere. And tell him that "not to know what happened

before thou wast born is forever to remain a child" or, as Hippocrates put it, "the physician must know what his predecessors have known, if he does not wish to deceive both himself and others."

AFTERNOON LECTURES

THE NEW YORK ACADEMY OF MEDICINE

announces a third series of practical lectures to be held on

FRIDAY AFTERNOONS

at four-thirty o'clock

The profession generally is invited to attend

1928

Nov. 2—The serum treatment and its evaluation in lobar pneumonia

JESSE G. M. BULLOWA,
Assisting Visiting Physician, Harlem Hospital

Nov. 2—Carcinoma of the larynx

JOHN EDMUND MACKENTY,
Senior Surgeon, Manhattan Eye, Ear and Throat Hospital

Nov. 16—The common affections of the colon: their origin and their management

JOHN LEONARD KANTOR,
Attending Gastroenterologist, Montefiore Hospital

Nov. 23—Clinical types of hypotension

ALFRED FRIEDLANDER,
Professor of Medicine, University of Cincinnati

Dec. 7—Certain medical complications of pregnancy and their treatment

WILLIAM W. HERRICK,
Visiting Physician, Presbyterian Hospital

Dec. 14—Management of spastic constipation and mucous colopathy in vagotonic persons

LEWELLYS F. BARKER,
Visiting Physician, Johns Hopkins Hospital, Baltimore

Dec. 21—The antitoxin treatment of erysipelas. (Lantern demonstrations)

KONRAD E. BIRKHAUG,
Associate Professor of Bacteriology, University of Rochester

1929

Jan. 4—The allergic diseases as encountered by the general practitioner

WILLIAM W. DUKE,
Visiting Physician, Christian Church Hospital, Kansas City

Jan. 11—Observations on pain in medical and surgical conditions

EMANUEL LIBMAN,
Consulting Physician, Mount Sinai Hospital

Jan. 18—Rheumatic fever

HOMER FORDYCE SWIFT,
Rockefeller Institute

Jan. 25—Carcinoma of the colon and rectum

DANIEL F. JONES,
Associate in Surgery, Harvard Medical School

Feb. 1—Diarrhoea and dehydration in young infants

OSCAR MENDERSON SCHLOSS,
Professor Diseases of Children, Cornell University

Feb. 8—Diseases of the prostate

HUGH HAMPTON YOUNG,
Visiting Urologist, Johns Hopkins Hospital

Feb. 15—Control of conception—present and future

ROBERT LATON DICKINSON,
Senior Gynecologist and Obstetrician, Brooklyn Hospital

Mar. 1—Medico-legal questions of interest to the general practitioner

CHARLES NORRIS,
Director of Laboratories and Chief Medical Examiner of New York City

Mar. 8—Epidemic encephalitis

FREDERICK TILNEY,
Visiting Neurologist, Neurological Institute

Mar. 15—Burns and their treatment

FREDERICK W. BANCROFT,
Director Department of Surgery, Fifth Avenue Hospital

Mar. 22—Abscess of the lung

HARRY WESSLER,
Associate Physician, Mount Sinai Hospital

Apr. 5—The medical examination

HARLOW BROOKS,
Visiting Physician, City Hospital

Apr. 12—Psychoanalysis and the general practitioner

LOUIS CASAMAJOR,
Professor Neurology, Columbia University

RECENT ACCESSIONS TO THE LIBRARY

Adam, H. A. Ueber Geisteskrankheit in alter und neuer Zeit.
Regensburg, Rath, 1928. 158 p.

Arrom, D. Tratado de patología y clínica circulatoria.
Barcelona, Libreria Sintes, 1927. 719 p.

Assmann, H. Die klinische Röntgendiagnostik der inneren Erkrankungen.
4... Aufl. Leip., Vogel, 1928, v. 1.

Babcock, W. W. A text-book of surgery for students and physicians.
Phil., Saunders, 1928. 1367 p.

Bagby, E. The psychology of personality.
N. Y., Holt, [1928]. 236 p.

Barcroft, J. The respiratory function of the blood. Pt. 2, Haemoglobin.
[2. ed.] Cambridge, Univ. Pr., 1928. 200 p.

Barretti, G. A new dictionary of the Italian and English languages...
[11. ed.] Lond., Pitman, 1928. 2 v.

Barker, J. E. Cancer; the surgeon and the researcher.
Lond., Murray, 1928. 483 p.

Barwell, H. Diseases of the larynx.
3. ed. Lond., Milford, 1928. 278 p.

Bateson, (Mrs.) B. William Bateson, F. R. S., naturalist.
Cambridge, Univ. Pr., 1928. 473 p.

Béclère, C. L'exploration radiologique en gynécologie.
Paris, Masson, 1928. 173 p.

Besredka, A. Etudes sur l'immunité dans les maladies infectieuses.
Paris, Masson, 1928. 414 p.

Bogardus, E. S. Immigration and race attitudes.
Boston, Heath, 1928. 268 p.

Bourque, N. O. The thyroid gland and its diseases.
[Chic., 1927]. 250 p.

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Phil., Saunders, 1928. 475 p.

Boyle, M. E. In search of our ancestors.
Boston, Little, 1928. 286 p.

Bram, I. Goiter prevention and thyroid protection.
Phil., Davis, 1928. 327 p.

Breitner, B. Die Erkrankungen der Schilddrüse.
Wien, Springer, 1928. 308 p.

Briffault, R. The mothers.
N. Y., Macmillan, 1927. 3 v.

Briggs, I. C. How to start in general practice.
Lond., Murray, [1928]. 158 p.

Brockbank, E. M. & Ramsbottom, A. The clinical examination of diseases of the lungs.
2. ed. Lond., Lewis, 1928. 112 p.

Brücke, E. T. Ernest Brücke.
Wien, Springer, 1928. 195 p.

Camis, M. La fisiologia dell'apparato vestibolare.
Bologna, Zanichelli, 1928. 358 p.

Cathcart, C. W. & Hartley, J. N. J. Requisites and methods in surgery.
Edin., Oliver, 1928. 476 p.

Cochrane, R. G. Leprosy in Europe, the Middle and Near East and Africa.
Lond., World dominion press, 1928. 73 p.

Cooper, L. F., Barber, E. M. & Mitchell, H. S. Nutrition in health and disease for nurses.
Phil., Lippincott, [1928]. 574 p.

Cramer, W. Fever, heat regulation, climate, and the thyroid-adrenal apparatus.
Lond., Longmans, 1928. 153 p.

Craveri, C. Dizionario di sinonimi e composti chimici con relative formole e pesi molecolari e le términologie.
Milano, Hoepli, 1928. 316 p.

Cuboni, E. La cura della paralisi generale progressiva con la malaria.
Bologna, Cappelli, 1928. 255 p.

Davis, H. Birth control. The fallacies of Dr. M. Stopes.
Lond., Oates, [1928]. 80 p.

Dearden, H. Medicine & duty.
Lond., Heinemann, [1928]. 234 p.

Doflein, F. Lehrbuch der Protozoenkunde. 5. Aufl. Teil 1. Allgemeine Naturgeschichte der Protozoen.
Jena, Fischer, 1927. 436 p.

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3. Aufl. Berlin, Springer, 1928. 664 p.

Driver, J. E. & Trease, G. E. The chemistry of crude drugs.
Lond., Longmans, 1928. 159 p.

Eggleston, C. Essentials of prescription writing.
4. ed. Phil., Saunders, 1928. 153 p.

Fawcett, M. G. & Turner, E. M. Josephine Butler. Her work and principles.
Lond., Ass'n. moral & soc. hyg., 1927. 164 p.

Fifield, L. R. The pathology, diagnosis & treatment of neoplasms originating in the walls of the urinary bladder.
Lond., Lewis, 1928. 94 p.

Filterable viruses. By H. L. Amoss...[et al]. Ed. by T. M. Rivers.
Balt., Williams, 1928. 428 p.

Fletcher, J. M. The problem of stuttering.
N. Y., Longmans, 1928. 362 p.

Forlanini, C. Scritti di Carlo Forlanini.
Bologna, Cappelli, 1928. 2 v.

Fraenkel, L. Soziale Geburtshilfe und Gynäkologie.
Berlin, Urban, 1928. 146 p.

Franklin, B. Autobiography of.
New ed. Boston, Houghton, 1928. 248 p.

Freystadtl, B. Kehlkopf und Rachen in ihren Beziehungen zu den Erkrankungen des Zentralnervensystems.
Berlin, Karger, 1928. 325 p.

Gaultier, R. Précis de coprologie clinique.
3. éd. Paris, Baillière, 1927. 567 p.

Gill, C. A. The genesis of epidemics, and the natural history of disease.
Lond., Baillière, 1928. 550 p.

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Berlin, Urban, 1927. 1252 col.

Haeberlin, C. Aerztliche Seelenkunde.
Leip., Barth, 1928. 181 p.

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Leip., Thieme, 1928. 134 p.

Handbuch der Kolloidwissenschaft... Hrsg. von Dr. W. Ostwald.
Dresden, Steinkopff, 1924-8. 3 v.

Heindl, R. Der Berufsverbrecher.
3. Aufl. Berlin, Heise. 560 p.

Hilger, W. Die Suggestion.
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Boston, Ginn, [1928]. 329 p.

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Berlin, Urban, 1928. 311 p.

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St. Louis, Mosby, 1928. 202 p.

Joyeux, C. Précis de médicine coloniale.
Paris, Masson, 1927. 931 p.

Kelly, H. A., & Burrage, W. L. Dictionary of American medical biography.
N. Y., Appleton, 1928. 1364 p.

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Berlin, Urban, 1928. 302 p.

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Berlin, Karger, 1928. 917 p.

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4. ed. Phil., Saunders, 1928. 1177 p.

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11. Aufl. Berlin, Meusser, 1928. 397 p.

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Lond., Bale, 1928. 445 p.

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Pick, G. Die Seele der Medizin. Phantasien eines Realisten.
München, Gmelin, 1928. 124 p.

Rabe, F. Richtlinien diätetischer Therapie.
Leip., Thieme, 1928. 110 p.

Ravaut, P. Syphilis, paludisme, amibiase.
3. éd. Paris, Masson, 1927. 284 p.

Raymond, F. Les maladies de l'estomac et du duodenum.
Paris, Masson, 1927. 414 p.

Richter, P. F. Wie soll der Arzt in der Praxis Stoffwechselkrankheiten behandeln?
Leip., Thieme, 1928. 78 p.

Schmieder, K. C. Geschichte der Alchemie.
München, Barth, [1927]. 613 p.

Sellmann, T. & Hanzlik, P. J. An introduction to experimental pharmocology.
Phil., Saunders, 1928. 321 p.

Smith, H. The treatment of cataract, and some other common ocular affections.
Calcutta, Butterworth, 1928. 287 p.

Spranger, E. Types of men.
Halle (Saale), Niemeyer, 1928. 402 p.

Stekel, W. Die Sprache des Traumes.
3. Aufl. München, Bergmann, 1927. 447 p.

Stiles, P. G. Human physiology.
5. ed. Phil., Saunders, 1928. 444 p.

Strunz, F. Astrologie, Alchemie, Mystik.
München, Barth, 1928. 350 p.

Tanguy, T. V. The science and practice of dental actinotherapy.
Lond., Kimpton, 1928. 111 p.

Thomson, H. H. Tuberculosis; its prevention and home treatment.
3. ed. Lond., Milford, [1928]. 99 p.

Transactions of the Medical society of London.
Lond., Harrison, 1927. v. 50.

Tullio, P. L'orecchio.
Bologna, Cappelli, 1928. 438 p.

Tuttle, A. D. Handbook for the medical soldier of the regular army.
N. Y., Wood, 1927. 691 p.

de Vecchi, B. Manuale tecnica e diagnostica delle autopsie.
2. ed. Milano, Vallardi, 1928. 771 p.

Vernon, H. M. The alcoholic problem.
Lond., Baillière, 1928. 252 p.

Waser, E. Synthese der organischen Arzneimittel.
Stuttgart, Enke, 1928. 227 p.

Webb, G. B. René Théophile Hyacinthe Laennec. A memoir.
N. Y., Hoeber, 1928. 146 p.

Wehrli, I. Das öffentliche Medizinalwesen der Stadt Baden im Aargau von der Gründung des Spitals, 1349-1798.
Aarau, Sauerländer, [1928?] 123 p.

White, W. P. The modern calorimeter.
N. Y., Chem. cat. co., 1928. 194 p.

Wickham, H. The misbehaviorists.
N. Y., MacVeagh, 1928. 294 p.

Wilde, P. The pyretic treatment of rheumatism and allied disorders.
[Lond.], Southern libraries, 1928. 98 p.

Wolff, F. Aus dem Leben eines Heilstättenarztes.
München, Gmelin, [1927]. 141 p.

Zangmeister, W. Lehrbuch der Geburtshilfe.
Leip., Hirzel, 1927. 834 p.

DATES OF ACADEMY MEETINGS

STATED MEETINGS

1st and 3rd Thursdays.

SECTION MEETINGS

Dermatology and Syphilis, 1st Tuesday.
Surgery, 1st Friday.
Neurology and Psychiatry, 2nd Tuesday.
Pediatrics, 2nd Thursday.
Otology, 2nd Friday.
Ophthalmology, 3rd Monday.
Medicine, 3rd Tuesday.
Genito-Urinary Surgery, 3rd Wednesday.
Orthopedic Surgery, 3rd Friday.
Obstetrics and Gynecology, 4th Tuesday.
Laryngology and Rhinology, 4th Wednesday.
Historical and Cultural Medicine, 4th Friday of October, December, February and April.

TRUSTEES, COUNCIL AND COMMITTEE MEETINGS

Trustees, 4th Wednesday.
Council, 4th Wednesday.
Committee on Admission, 1st Wednesday.
Committee on Library, 2nd Tuesday.
Public Health Relations Committee, Mondays.
Committee on Medical Education, 2nd Thursday.
Committee on International Medical Relations, 3rd Wednesday.

DEATHS OF FELLOWS OF THE ACADEMY

JOSEPH HENRY BYRNE, M.D., 167 West 76th Street, New York City; graduated in medicine from the College of Physicians and Surgeons, New York City in 1885; he was a Fellow of the American Medical Association, a Fellow of the American College of Physicians, a member of the Society of Alumni of St. Vincent's Hospital and Visiting Physician at St. Elizabeth Hospital. Dr. Byrne was elected a Fellow of the Academy February 8, 1900; he died September 22, 1928.

PAUL BRICE FITZGERALD, M.D., Professional Building, New Rochelle, New York; graduated in medicine from Syracuse University, Syracuse, New York, 1908; elected a Fellow of the Academy March 3, 1927; died September 2, 1928. Dr. FitzGerald was a Fellow of the American Medical Association, a member of the Alumni Association of the Knickerbocker Hospital, and Attending Surgeon at the New Rochelle Hospital.

CLEMENT JACOB HALPERIN, M.D., 641 High Street, Newark, New Jersey; graduated in medicine from the University and Bellevue Medical College; and was Clinical Professor of Dermatology and Syphilology in the same school. Dr. Halperin was elected a Fellow of the Academy March 3, 1927; he died September 30, 1928.

HOMER ERASTUS SMITH, M.D., 45 Park Avenue, New York City; graduated in medicine from the College of Physicians and Surgeons, New York City in 1878. He was elected a Fellow of the Academy February 5, 1920; he was also a Fellow of the American Medical Association, a Fellow of the American College of Surgeons and Assistant Surgeon at the Manhattan Eye, Ear and Throat Hospital. He died on October 4, 1928.

ALFRED KAHN, M.D., 48 East 49th Street, New York City; graduated in medicine from the University of Virginia in 1904. He was elected a Fellow of the Academy January 3, 1918, and he was also a Fellow of the American Medical Association. Dr. Kahn died October 8, 1928.

FREDERICK JOSEPH KAMMERER, M.D., Berne, Switzerland; graduated in medicine from the University of Freiburg, Freiburg, Germany, in 1880; elected a Fellow of the Academy March 6, 1890. Dr. Kammerer was a Fellow of the American College of Surgeons, the American Surgical Society, the International Surgical Society, the American Medical Association and Consulting Surgeon at Lenox Hill and St. Francis Hospitals; he died September 26, 1928, in Merano, Italy.

MEFFORD RUNYON, M.D., 516 Prospect Street, South Orange, New Jersey; graduated in medicine from the College of Physicians and Surgeons, New York City, in 1887; he was elected a Fellow of the Academy December 2, 1897. Dr. Runyon was former Chief of the Medical Staff of the South Orange Memorial Hospital. He died September 20, 1928.